With the Author's Compliments

ON THE

CLIMATE OF WORTHING.

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ITS

REMEDIAL INFLUENCE IN DISEASE, ESPECIALLY OF THE LUNGS.

BY

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TO

ARCHIBALD BILLING, Esq., M.D., A.M., F.R.S.,

ETC., ETC.

IN GRATEFUL REMEMBRANCE

OF THE

ADVANTAGES DERIVED FROM HIS CLINICAL INSTRUCTIONS

AT THE LONDON HOSPITAL,

WHICH HE WAS THE FIRST TO ESTABLISH

AT THAT NOBLE INSTITUTION,

THIS LITTLE BOOK IS

DEDICATED.

CONTENTS.

PREFACE.

The following description of the climate of Worthing is, in substance, a Paper read before the Royal Medical and Chirurgical Society, London, on the 12th of June last, which, it is believed, embraces all that is necessary to furnish a guide to the profession respecting its influence as a curative agent in disease.

I have also embraced the occasion to give my opinions upon several subjects that have a relation to climate *generally*, which, so far as I am aware, have hitherto received but little attention. I refer especially to the humidity of the atmosphere.

My observations on the influence of barometric fluctuations on the human system

are altogether new, and which additional attention tends only to confirm.

The question of ozone I have endeavoured philosophically to consider; and although I do not entertain a doubt as to the correctness of my views respecting its nature, I cannot expect them, in the absence of positive proof, to be at once received by men of science.

Every other subject connected with climate has also been dispassionately considered, and upon the several localities referred to, I have carefully avoided making any observations further than were necessary to illustrate the subject. Nor have I any other wish, than to present for the first time, by a lengthened series of observations, a correct account of the nature of the climate of one of the most beautiful localities in England, which was selected by the Court physicians, some fifty years ago, in preference to all others, as a residence for the Royal invalids on account of

its salubrity, its sheltered situation, and excellent bathing; in doing this, considering its proximity to London and central position on the south coast, I trust I have performed a not unimportant service to my medical brethren.

In preparing the work, I have also not been unmindful of the general interest which is taken in the subject of *the air we breathe*, and the necessity, as a question of vast *hygienic* as well as curative value, which persons feel of making themselves acquainted with it; I have therefore endeavoured to render my little book intelligible to all.

With respect to the Tables, these, though no doubt the least interesting, are the most valuable part of the paper, as they furnish an unerring guide on the several subjects which they include, and may therefore be consulted with advantage by all who wish to make themselves acquainted with the past, which may reasonably be presumed

to furnish an evidence of the future. A large portion, however, of this part of the work has been omitted, and extracts on *temperature alone* substituted, which may be found at pages 23, 24, and 25; this has been considered necessary, to reduce as much as possible the size of the publication.

WALTER G. BARKER.

18, The Steyne, Worthing.
August, 1860.

ERRATA.

Page 18, line 23; for *Beachey* read "Beachy."

—— 58 ,, 9; for *has* read "have."

CHAPTER I.

Introduction.—Practical Value of Meteorological Science.—The Normal Constituents of the Atmosphere.—Definition of the term Climate.—The Atmospheric Elements and Conditions upon which the Varieties of Climate Depend.

In the present day, when that department of medical science, which consists in the art of preventing disease, justly holds so prominent a position, I am induced to believe that any information on the subject of Climate, and especially on the peculiarities of one so near to the metropolis and so easy of access from all parts of the kingdom cannot fail to be acceptable.*

In giving a description of this locality, it has

* The work as a paper was originally addressed to the Fellows of the Royal Medical and Chirurgical Society, London, and is now more especially intended for the profession: the author, however, is aware how impossible it is, as well as undesirable, to ignore the fact of the growing interest which is taken in the subject of climate by those who wish either to continue in, or to be restored to, health; he has, therefore, as stated in the Preface, endeavoured to render his book intelligible to all.

been thought desirable to consider very briefly those laws and influences which regulate climate generally that have an immediate bearing upon the subject, and from these to show that it *must* possess an atmosphere which the observations that have extended over a period of upwards of ten years prove it to have, and in this way to remove all doubt; for the laws which regulate meteorological phenomena are found, as they are being investigated, to be equally definite with those that govern the motions of the heavenly bodies.

It would be wearying on the present occasion to present the vast array of figures that have been compiled during this long and uninterrupted period; it is intended, therefore, to give only the deductions from these, and should further information be needed, a reference can be made to the accompanying tables, which are a summary of the daily observations.

The work will also embrace a few meteorological facts which, it is believed, have hitherto remained unnoticed; as well as the effects of vicissitudes of the atmosphere upon the system generally and its diseases, especially of the lungs, for the cure and alleviation of which the climate of Worthing is

peculiarly adapted; to this latter, most careful attention has been directed, because I am satisfied that the reasonable expectations of benefit are frequently disappointed from a want of knowledge by persons of the occasions and seasons when they may with safety and advantage use the atmosphere from which they hope to derive benefit.

For instance, a lady from one of the midland counties, during the early part of last summer, was residing at Worthing for the benefit of her health; she had for years suffered from an irritable condition of the larynx, trachea, and bronchial tubes,—dry asthma, which she invariably found much aggravated in her own neighbourhood by exercise in the open air when the wind was from the east, and expecting the like effect at Worthing, confined herself within doors during the easterly winds which prevailed much at that season of the year, her time became irksome to her, and the health consequently was very little benefited. At this time she came under my notice. I advised her at once to go out every day when the wind was from that quarter; she did so with much benefit not only to her health, but to her chest as well: the reason of this will be explained hereafter.

On the other hand, it is common for persons who resort to the south coast during the winter, to be told by their medical advisers before they leave their homes to take as much exercise as possible in the open air; this is most excellent advice as a rule; but it frequently happens as a consequence, that invalids venture out on improper occasions, inflammation is excited, with increased cough and dyspnœa, and an aggravation of all the symptoms of their disease, and they hastily leave the town, thinking the air does not agree with them.

In describing the climate of a neighbourhood, it is unnecessary to do more than allude to the *normal* constituents of the atmosphere, viz. the oxygen and nitrogen, whose ratio is always uniform, or to the carbonic acid which, although varying in quantity, exists only in a very minute proportion; according to De Saussure it is from 3·7 to 6·2 measures only in 10,000 measures of air, or to the ammonia, a trace of which has lately been discovered by Liebig. The subject has reference rather to those atmospheric conditions and elements which are found to be in very variable proportions, these differences depending entirely upon the locality.

It has been thought desirable to include these under *five heads*, giving precedence to those which observation and experience have shown to be of the greatest importance: these are,—1, *The Temperature;* 2, *The Humidity;* 3, *The Pressure, Horizontal and Perpendicular;* 4, *The Ozone;* 5, *Other Accidental Ingredients*, comprising under each of these divisions the several conditions which have been found to modify them. A short reference will also be made to *Atmospheric Electricity;* the *Vegetation of the District*, and the *Instruments used;* the *Purity of the Air* at Worthing, and the causes of this will then be noticed; the *Quality of the Water* by which the town is supplied, and its *Mortality;* after this the *Influence of Atmospheric Vicissitudes upon the System* will be discussed; and lastly, the *Applicability of the Climate of Worthing to particular Diseases.*

CHAPTER II.

The Temperature.—The Causes which Influence this, viz.: The Sun's Rays; the Influence of the Water upon the Land; the Sheltered Position of a Locality; its Altitude; its Geological Character and its Aspect.—Standard Instruments necessary.—Extracts on Temperature from Tables during the whole period that observations have been taken.

The Temperature.—The causes which influence this will each be considered in detail, viz., the Sun's Rays; the Influence of the Water upon the Land; the Sheltered Position of a Locality; its Geological Character; its Altitude; its Aspect and its Humidity; this latter, however, will receive a separate consideration.

1. *The Sun's Rays.*—The influence of the sun's rays, and therefore the distance of any locality from the equator, takes precedence of every other in its relation to climate; and the general law that the mean temperature diminishes as the latitude increases, would appear to prevail throughout these islands, the temperature being about 1° lower

for each degree of increase of latitude, this regularity being somewhat modified by local conditions.

Thus the mean temperature at Teignmouth, South Devon, during the preceding year, 1858, was 50°.6, at Worthing 50°.2, at the Royal Observatory 49°.2, at Cardington near Bedford 49°, Nottingham 48°.9, Wakefield 48°.3, Scarborough 47°.3, and North Shields 46°.1. It will thus be seen how closely Worthing agrees with South Devon in mean temperature, the difference being only 4-10ths of a degree, which answers very nearly to its distance north of Teignmouth, which is about twenty miles, and the values at the Royal Observatory and more northern places establish the same conclusion. Less importance is undoubtedly to be attached to mean values than to ranges of temperature in their influence both on the healthy system and on disease; but when we bear in mind that lung diseases are notoriously aggravated by cold, and that in phthisis pulmonalis the heat and blood producing powers are so deficient as to render any reduction of temperature peculiarly obnoxious to persons suffering from this disease, a difference of two, three, or four degrees is well deserving of consideration.

2. *The Influence of the Water upon the Land.*

—Next to that of the sun's rays, the proximity of the water to the land seems to influence the climate of a locality, and to control especially its ranges of temperature. It would occupy too much time to give all the evidence possible on this point; it will be sufficient to produce a few instances in other parts of the world, as well as in this country, which are mainly attributable to this cause.

The most striking illustration of the moderating effects of the ocean is one that I have very recently obtained from Richmond, near Melbourne in Australia; there, during summer, and the prevalence of the hot winds which come from the north, or equatorial direction, and pass over nearly the whole of the Australian continent, the thermometer frequently reaches as high as 125° in the shade, and in winter the cold winds come from the same quarter, and are below the freezing point, notwithstanding their equatorial source; on the other hand, those which come from the southerly or polar direction, and therefore off the ocean, are never so warm as to be oppressive in the summer or disagreeably cold in the winter, but are at all seasons mild and equable.

At Madisson, in the State of Wisconsin, United States, which is situate almost in the centre of the great North American continent, and therefore quite unexposed to the moderating influence of the ocean, the ranges of temperature are exceedingly great, the thermometer being sometimes as high as 120° in the summer, and as low as 40° below zero in the winter, presenting, therefore, a range throughout the year of 160°, and the daily ranges correspond to this.

Compared to such vast fluctuations, those within these islands are remarkably small, and in proportion as its several parts are exposed to the influence of the sea, so shall we discover that they are less. At Guernsey and Ventnor they are smaller, as a rule, than at any other place in the kingdom at which observations are regularly recorded; at the former, from being a small island in the English Channel, and at the latter, from being situate to the south of the Isle of Wight, and therefore fully exposed to marine influences. Torquay and Teignmouth, also, from being on the tongue of land which forms the counties of Cornwall and Devon, have small ranges of temperature; and the site on which Worthing is built, as it

projects somewhat into the sea, being known to mariners as the "Worthing Point," in accordance therefore with the same law, *must* have an equable climate.

The moderating influence of the water upon the land appears to be produced in several ways. The temperature of the water in the Channel I have never found to be higher than 70° in the summer, or lower than 40° in the winter; *in summer*, therefore, the land, and the air upon its surface, being more strongly heated than the strata above, is rarified, ascends, and is replaced by the breezes from off the ocean, which in summer are about the same temperature as the water, and it is only when a strong land-wind sets in that this influence is counteracted and the temperature on the coast rises considerably. But even on these occasions it will be seen, by referring to the tables, that there is a great difference between the south coast and the interior; for instance, in the summer of 1858, the highest temperature at Worthing was 79°.5, at Greenwich 94°.5, giving a difference of 15°; at Cardington, near Bedford, 95°, difference 15°.5; and even in the more northerly counties the difference is very considerable, being at Notting-

ham 92°.2, difference 12°.7; at Wakefield 88°.4, and at Scarborough, on the Yorkshire *coast*, it reached as high as 79°.1, or only 4-10ths of a degree less than at Worthing.

If, on the other hand, we refer to Ventnor and Teignmouth in the same year, we shall discover how closely they approximate in their temperature to Worthing, being at the former place 82°, difference 2°.5 warmer; at the latter place, 78°.7, difference 8-10ths of a degree colder; and at Torquay, in the only year that observations have been published, viz. 1853, in which the temperature all over England was below the average, it was 75°, and at Worthing 73°.8, difference 1°.2 warmer at Torquay; thus showing that although the approximation be very close, the summer temperature is somewhat cooler at Worthing than at Ventnor and South Devon, corresponding in the same way as the mean temperature referred to in the last paragraph, with the few miles of increase of latitude.

It is interesting to observe how short a distance the sea-breezes extend inland; for it is no uncommon circumstance to notice a windmill near the shore working with a wind from off the sea, and another on the Downs, about two miles distant,

turned by a current in a different direction. The tides, also, which recede a distance of nearly half-a-mile, and give us some of the finest sands and sea-bathing in the kingdom, at every flow bring with them the invigorating breezes off the ocean, and lower the temperature of the land atmosphere.

In winter the influence of the sea upon the land is equally great, although the causes are somewhat different; at this season of the year the temperature of the water and the atmosphere above being greater than that of the land and the air over it, a gradual admixture of the one takes place with that of the other, according to the law of the mutual diffusion of gases, and the influence of the tides at this season of the year is as great as in the summer in commingling the two atmospheres and assimilating the one with the other, and if there be a difference of ten or fifteen degrees, as is sometimes the case, between the atmosphere over the land and that over the water, the influence is very considerable; there is also another cause which has a most powerful effect at sea-side places in maintaining the temperature; the atmosphere which comes from off the sea at this season of the year contains a large amount of aqueous vapour, which, coming

in contact with the colder air on the land, is towards the evening and night condensed, giving out its latent heat and contributing to the formation of clouds which shroud the earth, as it were, in a mantle, and prevent radiation from the earth's surface.

A short reference to the tables will again show how closely we agree in *winter temperature* with the most favoured places of resort on the south coast, and how wide the difference with those inland and to the north; taking again the year 1858, which has been selected on account of its being the last recorded at the time this paper was being prepared, the lowest temperature during the winter at Worthing was 25°.0, at Ventnor 26°.0, difference, 1°.0 higher at Ventnor; at Teignmouth 23°.8, difference 1°.2 warmer at Worthing; at Torquay, in the only year that observations have been published by the British Meteorological Society, the lowest temperature was 24°.0, at Worthing 22°.5, difference, 1°.5 warmer at Torquay, so that it would appear that in winter temperature, like the summer, both Ventnor and South Devon are a slight degree warmer, corresponding with the difference in latitude; if, on the other hand, we refer to the

same places inland and to the north which were mentioned when comparing the summer temperature, we shall find again how wide the difference. Thus, at Greenwich, in 1858, the lowest temperature was 20°.5, difference 4°.5 colder; at Cardington, near Bedford, 15°.0, difference 10°.0; at Nottingham 13°.2, difference 11°.8; at Wakefield 16°.5, difference 8·5°; and at Scarborough 20°.0, difference 5°.0.

I will now very briefly refer to those differences in *mean temperature* which occur between the sea side and the interior, taking Worthing on the coast, and by way of contrast, the most inland station, Cardington, near Bedford. In mean annual temperature the difference, as before stated, was, in 1858, 1°.2 less at Cardington, corresponding closely with the increase of latitude; if, however, we refer to the seasons in the tables we shall find the mean temperature of the interior in summer to correspond closely with the south coast, being at Cardington 57°.7, at Worthing 57°.6, the difference being almost, or altogether, in the winter temperature, which is considerably higher at the south coast than in the interior, being at Cardington 40°.4, at Worthing 42°.2.

Columns 5 and 6 in the tables it is scarcely necessary to notice further than to observe that in summer the mean of all the highest, or day temperature, is much higher, and the mean of all the lowest, or night temperature, is much lower in the interior than on the south coast.

Lastly, I refer to the *daily ranges of temperature,* which, as it implies, exercising a daily influence, gives, perhaps, the best evidence of the nature of a climate, for where these are small the air is invariably soft and unirritating. Taking, as before, 1858, the mean daily range for the year was, at Worthing 10°.9, at Ventnor 9°.5, therefore, 1°.4 less at Ventnor; at Teignmouth 12°.6, therefore, 1°.7 less at Worthing; in 1853, at Worthing 8°.7, at Torquay, in the same year, 9°.8, difference 1°.1 less at Worthing; the above four places have, as far as evidence goes, less ranges of temperature than any other on the south or south-west coast, and, as will be observed, Worthing is the least of the three on the coast, properly so called, for the position of Ventnor, in the Isle of Wight, may fairly be considered exceptional; the various causes which combine to produce this favourable result will be considered as we proceed.

I am disposed to think that the rays of heat, as well as light, are largely absorbed by water, and the circumstance of its temperature at the surface not being the same as that of the land, is easily accounted for by the admixture which is constantly going on from the action of the tides, winds, and currents, and as it takes a long time to heat the whole mass of water, so, when it is once heated, it is equally long in being cooled; this opinion is the result of numerous observations taken throughout the year; thus in the early part of summer I have never found the temperature of the water over 65°.0, however high the thermometer may have been on the shore, but during the later periods of the same season it will frequently reach to 70°.0; higher than this I have never found it. During the early and latter parts of winter there is the same difference, the temperature of the water usually not reaching its lowest point till the end of January or the beginning of February; the evaporation, also, which is constantly going on from the surface of the water, must have a material influence in summer in keeping down the sensible heat of the atmosphere contiguous to it, and during the winter the condensation of this vapour con-

tributes no doubt to maintain the temperature at this season by giving out its latent heat.

3. *Its sheltered situation.* The sheltered position of a locality has a most important influence on its climate. Immediately contiguous to Worthing are the South Down Hills, which have an average altitude of about six hundred feet, the base of which is situate about a mile and a half from the sea and a mile to the north of the town; they run from east to west, not in a straight line, but somewhat in a semicircle, and effectually shelter us from the winds that come from the north and north-east, and in a degree from the east and north-west winds: this is another of the causes of our small ranges of temperature; for in winter the cold winds come from these directions, and in summer the hot ones are from the same; their distance, also, is sufficiently great to prevent the reflected heat, if there be any, from having any influence upon the town, for their surface being covered with vegetation allows the sun's rays to a large extent to be absorbed.

And not only do these hills produce their influence by protecting us from the hot winds of summer and the cold winds of winter, but, by

reducing the force of these, allow the marine atmosphere, which comes from the opposite direction, to exert its full effect, each flow of the tide bringing with it from off the ocean its refreshing breezes, and lowering the temperature of the land atmosphere in summer, and raising it in winter to almost a level with its own.

The sheltered position of the town, and the plain upon which it is situate, give also a free play to the sea breezes which exert such a constant and moderating influence, especially during the summer.

4. *Its altitude.* The site on which Worthing is built is but a few feet above the level of the sea at high water; this contributes materially to produce a genial climate; for under the same circumstances the mean temperature of the air diminishes about 1°.0 for every three hundred and fifty feet of altitude.

From our low level, also, the hills to the north afford us a more effectual shelter, neither are we so much exposed to violent winds that come from off the ocean; and the bold headland of Beachey Head, five hundred and fifty-nine feet high, lying to the east south-east, reduces considerably the force of the winds from that direction.

To the south, and the south-west, winds, which are the most constant and the most equable, we are alone completely exposed; and it has been asserted that the promontory of Selsey Bill moderates in some degree the winds that come from this quarter.

5. *Its geological character.* In obedience to well known laws which regulate the transmission of heat, the geological character of a locality, and especially of its surface, has an important influence on its atmosphere or climate.

As a rule, the surface which reflects light, reflects heat; therefore, when this is composed of uncovered chalk, there will be great ranges of temperature; a surface that is stony or sandy, and barren, becomes very much hotter than one that is covered by vegetation.

In the Deserts of Africa, the heat of the sand often amounts to upwards of 150° or 160°; where the soil is stiff and clayey, there will usually be great ranges of temperature, being hot in summer, because a large amount of the rays of heat are reflected, and cold in winter, from its solidity and good conducting power; it morcover does not allow the free percolation of the rain, therefore, nearly all that falls upon it is evaporated, and this contributes

to keep down the temperature at this season of the year, hence the common expression a "eold elayey soil" may be eonsidered eorreet. A light, loamy soil, on the other hand, sueh as the town of Worthing is built on, absorbs heat during the day, and gives it out during the night; this is another of the causes of our small ranges of temperature. Upon the subjeet, however, of the influenee of soil upon temperature we have mueh to learn, for there are great diffieulties in the way of acquiring aecurate information on this point.

The light loamy nature of the soil, with the stratum of sand and flints beneath, allows also the free percolation of the rain, so that the moisture of the atmosphere is mainly derived from the oeean without any land impregnations; to this we owe *our complete immunity from intermittent fever.*

The following may be said to be the geological character of the surface of the eountry at Worthing: from four to ten feet of loam, below this a stratum of sand and pebbles, from one to ten feet in thickness, and underneath this a layer of chalk and flints.

6. *The aspect of the locality.* The deseription of the climate of Worthing would be ineomplete

without a brief reference to this. It is due south, or somewhat towards the east, and, therefore, fully exposed to the sun's rays; the beneficial influence of light, as well as heat, has long been known, and during my connexion with the London hospital, which has a long frontage nearly north and south, the patients were generally found to do better in the wards with a southern aspect: the sea frontage, therefore, for the above reason, and also from its being less exposed in winter to northerly winds, and in summer from its receiving the breezes direct from the ocean, is always to be recommended for invalids, especially in pulmonary complaints.

Before leaving the subject of temperature it is necessary to notice some of its most important fluctuations during the *whole* period that meteorological observations have been taken; these were commenced early in the year 1850, and regularly recorded on the 1st of December in the same year, and from that time to this they have been uninterruptedly continued.

These observations were first published by the British Meteorological Society, whose date of origin is 1850, in their September and December reports 1852. So much improvement, however,

has been made since its establishment, in the character of the instruments used, and so much importance is justly attached to the accuracy of these, to their having been compared with standards, and to their position as regards reflected heat, elevation, etc., that it has been deemed desirable to exclude all those observations which have not been taken under those conditions approved of by the society, one of the especial objects of which is to establish complete uniformity in these respects, without which the data would only lead to erroneous conclusions; nor do I think that any confidence should be placed in observations unless these are fulfilled, for the very foundation of their value consists in the means of comparison with those of others made elsewhere; and unless the circumstances under which they are taken be identical, it is obvious that they must mislead, instead of furnishing reliable evidence to those who are desirous of obtaining information on this subject; the tables, therefore, commence in 1853, and to the present time extend over a period of seven years, which it is believed is amply sufficient to establish on a firm foundation the nature of the climate of any locality; it may be as well to state, however, that

during the preceding years there was nothing discordant with the evidence obtained during the last seven, the fluctuations indeed were somewhat less, the lowest temperature during the three years being on the 21st of February, 1852, when it fell to 26°.7.

Referring now to the Tables,* we shall find that, in the winter of 1853, the *lowest temperature* at Worthing was 22°.5; at Torquay 24°; at Greenwich 18°; at Cardington near Bedford 13°; at Nottingham 13°.8; at Wakefield 9°.5. In 1854, at Worthing 23°.4; at Torquay 23°; at the Royal Observatory 13°.5; at Cardington 11°; at Nottingham —4° (four degrees below zero); at Wakefield 8°.5. The year 1855 was remarkable for its low temperature; and at Worthing the thermometer reached to 17°.5, its lowest point during the ten years; at Hastings to 15°; at Greenwich to 11°.1; at Cardington to 3°; at Nottingham to 6°.1; at Wakefield to 5°.2. In 1856, at Worthing to 21°.5; at Greenwich to 18°.5; at Cardington to 16°.5; at

* It has been considered unnecessary to give the *whole* of the Meteorological Tables from which these extracts are made, as they would materially increase the bulk, and in no way add to the value, of the work

Nottingham to 12°.5; at Wakefield to 3°. In 1857, at Worthing to 20°; Royal Observatory to 20°; Cardington to 18°.6; Nottingham to 17°.5; and Wakefield to 12°.5. The year 1858 has already been alluded to. In 1859, during which the frost in December was of great severity, the lowest temperature at Worthing was 20°.9; at Greenwich 14°; at Cardington 6°; at Nottingham 7°; and at Wakefield 5°; and in some parts of England, as at Norwich, it reached as low as 1°, and in others, as at Lampeter, to —2° (two degrees below zero).

If we now refer to the *summer temperature* we shall find the same favourable difference between the interior and the south coast, the *highest temperature* being, in 1853, at Worthing 73°.8; at Torquay 75°; at Greenwich 81°.7; at Cardington 81°.5; at Nottingham 82°; at Wakefield 80°.2. In 1854, at Worthing 80°.5; at Greenwich 88°.7; at Cardington 86°; at Nottingham 86°; at Wakefield 84°.2. In 1855, at Worthing 79°; Greenwich 83°.5; Cardington 83°; Nottingham 83°.5; Wakefield 83°.7. In 1856, at Worthing 81°.1; Greenwich 89°.8; Cardington 91°.5; Nottingham 92°.5; Wakefield 88°.2. In 1857, Worthing 77°.2; Greenwich 92°.7; Cardington 88°.6; Nottingham 88°;

Wakefield 88°.7. The year 1858 has already been noticed at pages 10, 11, 13, and 14. In 1859, at Worthing 80°.2 ; Greenwich 93° ; Cardington 92° ; Nottingham 89°.5 ; Wakefield 90°.

It will thus be seen that, if we take a series of years, there is nothing to alter the statements previously given when making comparisons between the several localities for the year 1858, showing the wide difference between the interior and the north of England and that of the south coast as regards fluctuations of temperature, the difference in annual ranges being about 20° less on the coast than in the interior, that is, 10° higher in the winter and 10° lower in the summer. During, however, excessively hot summers or cold winters, from the tempering influence of the ocean, the difference is much more considerable ; but when either the cold of winter or the heat of summer is moderate, then the temperature of the coast and that of the interior accord more closely.

CHAPTER III.

The Humidity of the Atmosphere.—The Rain.—Clouds, Fogs, and Mists.

The Humidity of the Atmosphere.—The humidity of the atmosphere, in its relation to climate, is of the utmost importance; to this subject, therefore, a large share of attention has been given.

The instruments that have been employed for ascertaining the amount of aqueous vapour in the atmosphere are the dry and wet bulb thermometers, commonly called "Mason's Hygrometer," and by the aid of this invaluable instrument the amount of humidity, short of saturation, is very accurately ascertained. By this we discover the cause of the well-known irritating effects, upon the pulmonary organs, of the north-east, and the soothing influence of the south-west, wind; the former being dry and arresting secretion; the latter moist and favouring it, and in this way relieving inflammation and congestion, and the harassing cough which

depends upon these morbid conditions, and just in proportion as the atmosphere approaches in its humidity to the point of saturation, so does it appear, as a rule, to conduce to the healthy condition of plants and animals; but if the air be unable to hold in solution the vapour, and it is condensed in the form of mists and fogs, it may be said to have reached to an amount which is undesirable at least, and doubtless impedes to some extent the due oxygenation of the blood; therefore, a locality where fogs or mists prevail is certainly not desirable as a place of residence in lung diseases.

The following is a summary of the deductions made upon this most interesting subject:—Saturation being represented by 100, the mean humidity of the whole of England in the year 1858, from thirty-seven observatories, was 82, of sea-side places 86, inland places 81, in intermediate places 83. If sea-side places be divided into north and south, we shall find the former to be represented by 88, and the latter by 84. If, again, a comparison be made between the south coast watering places, which are celebrated for the mildness of their climate and their beneficial influence in pulmonary diseases, we shall find at Worthing it was 85, at

Ventnor 84, at Osborne 84, at Teignmouth 81. In order, however, that reliable conclusions might be drawn between Worthing, Ventnor, and South Devon, the average humidity between the two former places has been taken for six years with precisely the same results, and as far as the information at command would allow, with South Devon, which also corresponds closely with the above.

But that a correct opinion may be formed upon this subject, it is necessary not only to consider the humidity of the atmosphere, that is, its approach to the point of saturation, but also the actual amount of aqueous vapour present, which is represented in column 11 in the Tables, under the head "Mean Weight of Vapour in a cubic foot of air," for at different temperatures the atmosphere is saturated by a different amount of vapour, its capacity increasing with the temperature. When referring, therefore, to this column, we shall find that although the humidity of northern watering places be represented by 88, and the southern by 84, the former has by weight less aqueous vapour than the latter, the apparent increase of humidity depending solely upon the re-

duetion of temperature, being 3·4 grains in thc one ease, and 3·5 grains in the other.

So again, on eomparing our south eoast climates, although the humidity of Ventnor is represented by 84 and Worthing by 85, the former contains 3·8 grains of aqueous vapour in the eubie foot, and the latter only 3·6 grains, and at Teignmouth only 3·4 grains. The approach, howcver, of the atmosphere to the point of saturation, as represented in the column "Humidity," is, perhaps, the best guide to that partieular eondition of the atmosphere whieh influences our systems; the other, nevertheless, should not be lost sight of, and we ought espeeially to eonsider the eorrelation which exists between temperature and humidity before we form an opinion respecting the influence which any partieular loeality may have upon the system. This subject will be again referred to in that portion of the paper in which the effeets of vicissitudes of the atmosphere upon the system are discussed.

Rain.—The amount of rain that falls in any locality, and its distribution throughout thc year, matcrially influenecs the elimate, and cspeeially the humidity; it is, therefore, bricfly notiecd herc. Upon rcferring to the Tables for the year 1858, it

will be found that the number of days on which rain fell at Worthing was 107, at Ventnor 143, at Teignmouth 168; the quantity at Worthing was 18·8 inches, at Ventnor 24·7 inches, at Teignmouth 24·6 inches; this, however, was a remarkably dry year; still, the *comparison* would apply. If the average for six years be taken, we shall find at Worthing the number of rainy days was 141, at Ventnor 151; and the quantity of rain that fell at the former place 23·9 inches, and at the latter 27·5; in Cornwall and Devon, according to Mr. Glaisher, it is from 30 to 40 inches.

It would appear, therefore, that the number of rainy days, and the quantity that falls, are less at Worthing than at Ventnor and the West of England; the circumstance is important thus far, that persons who resort hither for the benefit of their health, are enabled to take exercise more frequently in the open air.

Clouds, Fogs, and Mists.—Column 17, "mean amount of cloud" as a means of *comparison* with other places, may be passed by; but mists and fogs, which are clouds occupying a lower elevation, need a short notice.

Two or three times during the heat of summer

mists or sea-fogs prevail for a few hours, as at all other sea-side places; but land-fogs do not occur upon an average three days in the year, for the conditions essential to their production do not exist, viz., a stagnant atmosphere, a cold clayey soil, which is a good conductor of heat and retentive of moisture; or low grass-lands, which also retain moisture and radiate heat very freely.

In confirmation of the above, I have the evidence of the Rev. William Read, M.A., our much esteemed chaplain, who for his astronomical discoveries and researches has a world-wide reputation; he states, "that he never saw the gauze ring of Saturn in the north of England, but can distinguish it here, and that he can make out more of his satellites:" this he considers one of the keenest tests of a translucent atmosphere. I have also the statement of an intelligent farmer, now residing in the vicinity, who affirms that in the Weald of Sussex, where the above conditions prevail, "that fogs are ten times as common as in this neighbourhood;" and my wet bulb thermometer does not by its reading, being the same as that of the dry, give evidence of a saturated condition of the atmosphere more than three times in the

year, although it often approaches to 90. The average, however, as before stated, is 85, a condition which I have no hesitation in asserting, from constant observation, is the one most conducive to the establishment of the healing process in the lungs.

CHAPTER IV.

The Pressure of the Atmosphere, Horizontal and Perpendicular.

The Horizontal Pressure of the Atmosphere, or the force of the winds, and the influences which modify these, have been already referred to in the paragraphs relating to *Altitude* and *Sheltered Situation*. The direction of the wind is noticed at 9 A.M., and a summary of these observations is given in the tables; but each day the tides and the difference between the temperature of the land and the water so modifies these, that very imperfect information is conveyed by them. For instance, the wind, which at 9 A.M. in the summer is east or east-north-east, from the influence of the increased temperature of the land, which takes place as the day advances, or of the tides, becomes south-east, that is, blows from off the ocean, and its character has completely altered, being converted from a hot, dry, and harsh wind to a soft and cool one, that is, loaded with humidity, and its tempe-

rature reduced: this explains the difference mentioned at page 3, between the effects of an easterly wind in the interior and one at Worthing, and the cause of the beneficial influence in the case previously noticed: the prevailing winds, however, are from off the ocean, and chiefly from the south-west, west, and south, producing at every season of the year a tempering and salubrious influence.

The Perpendicular Pressure of the Atmosphere, as indicated by the barometer, might for the purposes of useful comparison between one place and another, be passed by altogether; still it may be as well to observe that, within these islands, the readings of the barometer are less and the fluctuations greater in the north than in the south, the difference, however, which is about one-tenth of an inch, is too small to produce any sensible influence upon our systems; but when the extent of barometric fluctuations *generally* is considered and their effects observed, they are highly interesting, and in many cases practically useful. This subject will be again referred to when we speak of the influence of atmospheric vicissitudes upon the system.

CHAPTER V.

Ozone.—Other Accidental Ingredients.

The Ozone. —The still mysterious principle to which the term ozone is given next engages our attention, and on this subject great labour has been bestowed with a view of elucidating some of the points respecting it: after detailing these I shall venture, in the absence of positive evidence, to give my opinion respecting its nature, leaving, however, the question to be finally decided, if possible, after more extended experiments.

Desultory observations had been taken before, but on the 1st of January, 1859, my recorded series commenced, and the results of these, which have been continued without interruption up to this time, are the following:—The first noticeable and interesting fact was the presence of this principle with the winds from off the ocean, and generally in proportion to their force, being sufficiently great during a gale to tinge the papers, which are Dr.

Moffat's,* in the course of half-an-hour, and to colour them up to 10, the highest point in the scale, within eight hours. When there was a gentle breeze, ozone was always present, but in a minor degree; on the contrary, when the wind was from the land, there was very little ozone, and often none at all. In order to prove that the mere direction of the wind had nothing to do with the presence or absence of this principle, I at once entered into a correspondence with several gentlemen at observatories both in England and America, and my first answer was from John Woodall, Esq., B.A., of Scarborough, and as it is altogether so confirmatory of my own observations, and as they are supported by those of every other gentleman with whom I have communicated both in England and America, namely, *that its source is from the ocean,* I give an extract from his letter:—

"For several years observations have been car-

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* These consist of strips of paper carefully prepared with iodide of potassium and starch; and the proportion in which this principle exists in the atmosphere is estimated by the amount of decomposition which takes place in the iodide of potassium, which, reacting on the starch, produces iodide of starch, to which the colouring is due, the amount being estimated by a scale from 0 to 10.

ried on here with Dr. Schonbein's papers, and as the results have been almost uniform, I venture to lay before you a short *résumé*. When the wind blows from any point between north-east and south-east, the air is always highly charged with ozone, sometimes, also, when the wind is between north and north-east, and south-east and south, but only in comparatively few instances; while, on the contrary, when the wind is from any point of west, from north to south, I believe not one single instance of its presence has been observed."

The position of Scarborough on the north-east coast, and Worthing on the south, are peculiarly favourable for establishing the fact, that it is not from any particular direction of the wind or ozoniferous current in the atmosphere, as had been hitherto supposed, but rather from the circumstance that it comes from off the ocean, in whatever direction that may be. This opinion is supported by that of Admiral Fitzroy, F.R.S., Superintendent of the Meteorological Department of the Board of Trade, whom I have to thank for an introduction to Lieut. Chimmo, of H.M.S. "Sea Gull," now stationed off Skye Island, and who took observations during a voyage from England to Aus-

tralia, on board the "Royal Charter," lost a short time since. He states, in a letter just received, that "his observations have been mislaid, but to the best of his recollection, ozone was *always* present at sea: whereas at Bedford, in the interior of England, the number of days on which ozone was present in 1859 was ninety-one only, and the average daily amount throughout the year was 0·9; at Worthing, the number of days on which ozone was present was 305, and the daily average was 4·4." It would extend this paper to too great a length to make further extracts in confirmation of the above, viz., that the chief source of this principle is the ocean; it may, however, be considered as *an established fact.*

Having arrived at this decision, I directed my attention to the question of the difference between the atmosphere off the ocean and that from off the land, which led to the discovery, not of the presence of chloride of sodium, for that had been long known, but of a close correspondence between the amount of this salt in the air and rain-water, and the existence of ozone in the atmosphere. In the mean time, careful observations were made to discover if any correlation existed between electric

phenomena and the amount of this principle; and the opportunities during last summer, when these disturbances were unusually great, were abundantly sufficient to test this; the result was an entirely negative one, and in low latitudes, where electric phenomena are much greater than in the higher, it does not appear from the evidence of Lieut. Chimmo that there is more ozone. For in the same letter above referred to, he also states, "On the north-west coast of Scotland, I have found more ozone than in any other part of the world."

The existence, therefore, of this principle at sea, on the seacoast, and inland during the prevalence of winds from off the ocean, the circumstance, also, of the quantity diminishing according to the distance, and the relation which prevails between its presence and that of chloride of sodium in the air and rain-water, as well as the complete absence of any evidence in support of a correlation between it and electric phenomena, would seem to point to its being, *Free Chlorine, developed by the decomposition of the chloride of sodium.* If this principle were ozone, that is electrised oxygen, it would prevail equally on land as at sea. I am well aware that this statement may be met by the explanation

that on the land, at its formation, it at onee meets with miasmata, the result of the decomposition of organic matter, and combining with these its effeets are neutralised, and it therefore eeases to produce any effeet on the test-papers. There is nothing, however, to support this opinion ; and if at any future period a relation should be diseovered between this prineiple and eleetrieity, it would in no way alter the proposition, nor set aside the established faet of the great preponderance of this principle at sea ; for if eleetrie disturbance be necessary for its production, it seems more probable that this would effect the decomposition of a well-known salt, rather than what has hitherto been considered an elementary substance. In order, however, to discover if possible its nature, the following experiments were instituted, throughout whieh I had the able assistanee of Mr. Edward C. Cortis Stanford of this town, who is a Fellow of the Chemieal Society, London, and the analyses were entirely conducted by him.

1*st Experiment.*—The air by an aspirator was drawn through two of Woulff's bottles ; the first eontaining a solution of indigo, and the seeond a solution of nitrate of silver. In two days, the

first was completely decolorised, and the latter blackened. Both these results took place during rain, and when the usual papers indicated much ozone.

2*nd Experiment.*—Air was drawn through, first, a chloride of calcium tube filled with wool: second, a Woulff's bottle containing two ounces of water: third, another containing two ounces of a weak solution of pure potash, at the rate of fifty-four gallons daily, for a month; about 1,600 gallons were drawn through altogether;—at the same time air, at a corresponding rate, was drawn through solutions of indigo. During the month, three bottles of two ounces each were decolorised; the first and third contained one drachm each of sulpho-indigotic acid, and the second, two drachms; the latter was decolorised in about a fortnight, and the two former in about a week each. At the end of the month, the various solutions were submitted to examination: the decolorised solutions of indigo gave no evidence of nitric acid, and no appreciable precipitate with nitrate of silver. The wool in No. 1 gave no traces of chloride of sodium, for great care was taken to exclude the rain-water. The water in No. 2 contained carbonic acid,

as did also the potash in No. 3, but neither gave evidence of chlorine sufficient to precipitate nitrate of silver, nor did the water in No. 2 decolorise the solution of sulphate of indigo. There was an average amount of ozone and rain during the month.

3rd Experiment.—A gallon of rain-water, collected on the 8th of the same month, was found to contain 20·48 grains of chloride of sodium, corresponding to 12·32 grains of chlorine; two ounces of the same rain-water mixed with one drachm of sulpho-indigotic acid, decolorised it completely in twelve hours.

These experiments are valuable thus far; *they show the presence of a principle in the atmosphere which bleaches a solution of sulphate of indigo with a rapidity corresponding to the colouring of the test-papers, and the amount of chloride of sodium in rain-water.* On account, however, of the close resemblance between the chemical properties of chlorine and ozone, and the minute proportion in which they exist in the air, it appears necessary that the experiments should be extended over a much longer period in order to prove which of these two elements it may be. Yet if, on the

one hand, we consider that the decomposition of animal and vegetable matter is constantly going on and contaminating the atmosphere, and on the other, the well-known antiseptic and purifying influence of chlorine, our minds are forcibly led to the conclusion, that it is this principle in a free state that is diffused through the atmosphere, and, at the same time, to admire the magnitude of the source from which God in his goodness has supplied a principle so necessary to the well-being of mankind. Considering, however, the eminent men who have devoted their attention to this subject, and that Professor Schonbein, overlooking the grand source of this principle, denies altogether the existence of free chlorine in the atmosphere, I am unwilling to give an absolute opinion opposed to the existence of atmospheric ozone; yet I cannot help expressing a conviction that every well-ascertained occasion of its presence might be traced to this source, and that the balance of evidence, therefore, is in favour of its being *Free Chlorine* and not *Ozone*.*

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* From the great prevalence of oceanic winds, the south coast is peculiarly favourable for setting this important question, if possible, at rest. The author's researches, therefore, on this subject, are about to be renewed.

5. *Other Accidental Ingredients.* It is only within the last few years that meteorological science has received that attention which has enabled us to dispel the doubts and vague theories that have enveloped the subject, the result of which was to attribute the prevalence of particular diseases to ingredients which had no ascertained existence, as Catarrhal Epidemics by Dr. Prout, to Selenium, and cholera to some other substance in the atmosphere of a like character; throughout this paper, I have avoided, as much as possible, all hypotheses. I will, therefore, refer to only two substances, viz., chloride of sodium, already mentioned as having been largely detected, and iodine, which may be fairly presumed to exist in the atmosphere at the sea-side; for it has been detected in combination with bases in sea water, marine plants, and animals, and in several kinds of plants growing near the sea. Starch papers, however, very carefully prepared, have been exposed to the atmosphere for weeks, without exhibiting the slightest evidence of free iodine; still the odour of the ocean, or what nautical men speak of with such gusto, as a "sniff of the briny," affords, in my opinion, unmistakable evidence of its presence.

CHAPTER VI.

The Electricity of the Atmosphere.—The Vegetation of the District.—The Instruments used.—The Purity of the Atmosphere at Worthing.—The Absence of Manufactures.—The Drainage of the Town.—The Character of the Soil.—The Water.—The Mortality.

1. *The Electricity of the Atmosphere.* For some time attention has been paid to atmospheric electricity, with a view to discover whether any influence is produced on the system by altered electric states of the atmosphere, and the result has been a completely negative one; we have no proof that electricity, either positive or negative, exerts any influence whatever on our systems, except during their inductive actions; all the effects that have been attributed to it are easily accounted for by the altered temperature, humidity, and barometric pressure of the air.

2. *The Vegetation of the District.* No better evidence can be given of the climate of a locality than its vegetation, and the difference in this

respect between it and other parts of England was the first circumstance that attracted my attention, and encouraged me to persevere in the somewhat arduous and costly task of taking the series of meteorological observations, which form the basis of this paper, and which have so completely confirmed the opinion that any person might have arrived at, who had attentively noticed the subject; on this I shall be very brief, enumerating only a few facts connected with it.

Last year, wheat was cut in the neighbourhood of Worthing on the 11th of July; it is usually about three weeks earlier than in the north of England. The London and Brighton markets are largely supplied with fruits and vegetables from this district, which are considerably in advance of many others; this forward state of vegetation is not owing to the warm summers—for they are usually very cool—but to the mild winters; the sheltered position beneath the hills; and the warm alluvial character of the soil; and to the same causes we owe the flourishing condition in the open air of many exotics: at West Tarring, about a mile and a-half to the north-west of Worthing, the fig-tree grows most luxuriantly, and is very

productive, and there are several whose age is estimated at one hundred and fifty years; the myrtle also flourishes remarkably well in the district; and there is a tree in the same village growing in the open air upwards of sixty years old; and in some seasons this shrub has been seen flowering at Worthing after Christmas; the magnolia grandiflora also will generally continue to bloom during the early winter months; and there is a pomegranate tree in the centre of the town, planted about a quarter of a century ago, which produced this year (1859) upwards of three hundred fruit, as large as a small orange.

The following are also frequently seen in blossom during the winter. The heliotrope, the violet, and mignonette; roses of various kinds; the pirus japonica, the lobelia, and valerian; cinerarias, verbenas, and daisies; the dandelion, the furze, and candy tuft; primulas and daphnes; the hydranger, the fuchsia, and wall flower; the jessamine, and many others. Whilst on this subject, however, I would offer a caution; too much must not be expected; winter is winter on the south coast as elsewhere, and it often happens, that an early frost or a cold wind from the north will alike nip the vegetation; yet,

when we compare our thermometers with those at other places, we find, as the tables show, a most agreeable contrast.

3. *The Instruments employed.* The meteorological part of this paper would be incomplete, and the results reasonably open to disputation, if a short notice of the instruments used and their position were not given. The barometer was made by Barrow. The maximum, the dry and wet-bulb thermometers, and electrometer, by Negretti and Zambra; and the minimum, by Watkins and Hill. This latter, although of spirit, is exceedingly accurate; they have all been compared with the standards at the Royal Observatory, Greenwich, by that eminent meteorologist, James Glaisher, Esq., F.R.S., the Superintendent of the Meteorological Department, and Secretary to the British Meteorological Society, and approved of by him. Their position is in a large garden, at the rear of my residence, about one hundred yards from the sea, four feet and a-half from the ground, and merely protected from the sun and rain by a covering projecting about two feet from a wall, with a north aspect, against which they are placed.

4. *The purity of the Atmosphere at Worthing.*

Many circumstances combine to render it in this respect unexceptionable. These are—

I. *Its small population,* which is about 6,000.

II. *The Extent of Acreage over which this is distributed.* Very few towns, probably none in the kingdom, with the same population, occupy such an extent of surface, the peculiar feature being its beautiful villas and gardens.

III. *The Absence of every kind of Manufacture,* so that we are entirely free from the pernicious influence of a carbonised atmosphere, and other gases evolved from these; and by the authority of the Local Board, every process calculated to injure the health of the inhabitants has been removed.

IV. *The Drainage of the Town.* This is, perhaps, the most complete in the kingdom: every cesspool and other abomination has been suppressed, and water-closets substituted. It has been ably described by Dr. Collet, I therefore use his words :—

"The drainage has been wholly remodelled; a main brick sewer or culvert, of an egg shape, measuring 3 feet 2 inches by 2 feet 3 inches, has been carried through the principal streets, at a depth, in some parts, of 23 feet, and is connected

with the other streets and with *every house* by branch drains of stone-ware, varying in diameter from 15 inches to 6 inches. The main sewer terminates in a sumpt 6 feet 2 inches by 2 feet 10 inches, and a sewerage-well 30 feet deep and 10 feet in diameter at the top, reduced to 6 feet at the bottom. This well is situated considerably to the north-east of the town, and an artificial fall is obtained into it from every direction. In it is placed a sewerage-pump, consisting of three fifteen-inch barrels, worked by steam-power, and connected with the engine in the water-tower by an iron shafting and driving gear, by which it is pumped through an outfall sewer emptying itself into the sea, at a place *two miles* eastward of the town, called Sea-Mill Bridge. There the sewerage mixes with a stream of pure water from the hills, and with the general drainage of the district. It is worthy of remark, that the abundant supply of pure water, mixed as it now is with the sewerage, so completely, by its antiseptic properties, counteracts the putrefactive fermentation, that neither at the works, nor in the immediate neighbourhood of the outfall, is there any disagreeable smell."

V. *The Character of the Soil in the Town and*

Neighbourhood. This has been already described at pages 19 and 20.

VI. *Its Position on the Coast,* from which there is a constant commingling of the pure ocean atmosphere blended with chlorine?, with that on the land.

Lastly. *Our Proximity to the Hills,* which are not merely a narrow ridge, but, as will be seen by referring to the Ordnance map, are from five to six miles in breadth, and in some parts upwards of 800 feet high, so that when the wind comes from the north, it may be said that we have a mountain breeze, and when from the south, those from off the ocean. These conditions, with a well-drained town in the centre of a highly cultivated district, render the spot eminently conducive to health, and the Mortality Tables of the town, which we shall notice after the next paragraph, show that this is the case.

5. *The Water.* The supply of water to the town, and its quality, require a short notice. It is obtained from a well 70 feet deep, and has a bore into the chalk 295 feet further,—in all, 365 feet, from which there issues an abundant supply of excellent water: this is lifted up by an engine

to a tank at the top of a tower, 110 feet high, from which the town is supplied at constant pressure. The degree of hardness is 17, and after boiling, 4·7, thus corresponding to river water in softness, with the advantage of being entirely free from organic matter, and well aërated; it is therefore, both suited for domestic purposes and agreeable and salutary as a beverage.

6. *The Mortality of the Town.* This is the best evidence of its sanitary condition, and to a great extent of its sanative influence. Statistics, therefore, on this subject have been obtained from the Registrar of the District for the last ten years; the following are the results:—

	Per 1000.
Average for the ten years ended Dec. 31, 1859 - -	16·2
Average for the seven years which preceded the operation of our sanitary works - - - - - - ..	16·5
For the last three years, during which they have been in full operation - - - - - - - - -	15·9
And last year, when they may be supposed thoroughly to have told on our population, it was as low as - - - - - - - - - - - - -	14·5

This is, perhaps, the lowest ever recorded of any town of the same size in the world's history. In working out these results the visitors, or floating population, have been altogether excluded, but

their deaths included, so that in reality the death-rate is lower than is here represented. The Registrar-General gives 17 per 1,000 as the "healthy death-rate;"* at Worthing, as shown above, it has been below that for the last ten years. The observations, therefore, previously made upon the purity and salubrity of the air, are fully supported by the above figures. I cannot forbear, also, to notice the small mortality amongst children.

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* For the benefit of non-medical readers, it may be as well to explain, that by "the Healthy Death-Rate" is meant, that where every preventible cause of disease is removed, and the district is brought to the highest possible standard of salubrity, that the annual number of deaths is 17 for each 1000 of the population; and if an extensive district be taken, inland as well as marine, this may be a correct standard, but at favourably situated sea-side places we ought, I am satisfied, to expect something better than this. For instance, in the village of Angmering, seven miles to the west of Worthing, which contains a population of upwards of 1000, and is remarkably well situate for the purposes of drainage, the average for the last five years has been somewhat below 14 per 1000. I mention this to show the highly salubrious character of the whole neighbourhood, where local causes are not allowed to prevent it. It may also be stated, by way of contrast, that in all England and Wales the mortality is about 23 per 1000; in town populations, which includes London, it is somewhat above 25 per 1000; and in the country, somewhat below 21 per 1000. The cause of the low mortality on the south coast, is explained by the warm winters and cool summers reducing materially the two great sources of disease.

CHAPTER VII.

The Effects of Vicissitudes of the Atmosphere upon the System.—The Effects of Temperature.—Of Humidity.—Of the Combined Influence of Temperature and Humidity.—Of the Pressure of the Atmosphere, Horizontal and Perpendicular.—Of the Ozone.—Of the other Accidental Ingredients.

1. *The Effects of Temperature.*—This is the most important subject of all in relation to climate; but the influence of vicissitudes of temperature upon the system, and especially of sudden transitions, in causing disease and increasing the rate of mortality, are too well known to render it necessary to occupy more than a very brief space for its consideration.

Neither the interior of large continents, in which the ranges of temperature are very great, nor the excessive heat of the tropics, or the low temperature of the polar regions, appear favourable to the full development of the human race. The diarrhœa of summer, and other diseases of the gastro-intestinal system, are mainly produced by the

elevated temperature, while inflammatory diseases of the lungs and respiratory apparatus are largely diminished; on the other hand, the low temperature of winter produces an enormous increase of lung-diseases, with a relief to those of the gastro-intestinal system. It is unnecessary here, to enter more fully into this important subject.

2. *Of Humidity.*—Very erroneous ideas seem to prevail on this subject; for there is scarcely a work that has been written, in which it has been referred to, that does not contain some grave error, and a humid climate is spoken of as something pernicious.

The opinions that have prevailed on the influence of humidity, appear to have arisen from the circumstance of moisture on land being usually associated with malaria, the production of which it seems so much to favour, and the depressing influence that has been attributed to it is, I am satisfied, mainly owing to the pernicious influence of the miasma with which it is *usually* associated. Low damp situations therefore, as a rule, are with propriety avoided; but when a district has been well drained and cultivated, and the soil is of a nature to permit the free percolation of the rain

that falls upon it, these localities seem the most favourable to the health and development of the system. The low mortality of our own neighbourhood is a proof of this. Again, the great source of evaporation is the ocean; at sea therefore, the atmosphere is more humid than anywhere else; yet of all the pursuits that are conducive to health, that of the sailor seems the most, and the mortality tables of our navy present a favourable contrast with those of the sister service. It would appear, therefore, that when the humidity is marine, or, on land, when it is entirely free from the products of the decomposition of vegetable and animal matter, it is most conducive to the healthy condition of our systems.

Under the influence, also, of the humid climates of Scotland in the northern hemisphere, and Patagonia in the southern, the human race appears to reach its highest condition of physical development; and the native inhabitants of New Zealand, which is one of the most humid climates in the world, are surpassed by none in symmetry, size, and strength; whilst those of Australia and Central Africa, which are the driest, are in the lowest state of physical and mental degradation.

Again, the inhabitants of the British islands generally, of Holland, Denmark, and Northern Germany, are equal to, or perhaps surpass, in physical and intellectual development, those of every other race on the surface of the globe, and offer a striking contrast to the stunted forms of the Mongol and Tartar tribes of Central Asia.

The above illustrations embrace almost every variety of temperature; we cannot, therefore, refer these differences to this: it is impossible, however, to disconnect the influence of temperature with that of humidity, or even to assert that the latter has a greater influence than the former: and the results of civilization must not be overlooked. Enough, however, it is believed, has been stated to support the proposition previously made, that the abundant presence of moisture in the atmosphere, is essential to the well-doing of the human system.

But as the correlation of temperature and humidity is so intimate, and their effects so constantly associated, in the few more observations about to be made, it has been thought best to consider them in connexion, especially in relation to the climates of these islands, and their influence on the production, the cure, and alleviation of disease.

3. *Of the combined Influence of Temperature and Humidity.* Opinions seem to prevail on this subject also, which are not supported by observation. For instance, a cold humid climate is often spoken of as pernicious, a warm humid one as relaxing, and having an injurious influence, and a dry atmosphere as beneficial. My own observations, and a careful attention to the origin of diseases, has led me to entertain altogether contrary opinions to these. The diarrhœa of summer, and cholera where it has prevailed, have generally dated their commencement to a hot, dry easterly wind, and are usually mitigated when it changes to the opposite quarter, is loaded with aqueous vapour, and the temperature reduced. Inflammatory diseases of the lungs, also, will be found to prevail to a far greater extent when the wind is from the east and north-east, that is, when it is dry as well cold, or, to use a common expression, when the atmosphere is bracing.

During the winter of 1859-60, easterly winds prevailed but very little; although on two occasions, in December and February, the temperature was unusually low; the result was, that the severer forms of lung-diseases were almost entirely absent.

With respect to the *relative* influence of cold, and the absence of moisture upon the lungs and air-tubes, it would appear, that whilst cold diminishes the afflux of blood to these parts, and therefore their secretions, the effect of a dry condition of the atmosphere conjoined with cold, is to interrupt the process of secretion altogether, or so diminish it as to produce that altered condition of the capillaries termed inflammation.

Neither a cold, nor a dry atmosphere, separately, seems to produce a pernicious influence upon the respiratory apparatus; it is only when these exist together, that inflammation usually results. The hot and dry winds of summer which come from the east and north-east, although oppressive to the system and irritating to the lungs, do not produce any very injurious influence upon them, —they are irritating, but do not light up disease. And in winter the north and north-west winds, although cold, are always humid, and never appear to produce pulmonary disorders; but when in winter the wind comes from the east and north-east, and are both cold and dry, the effect upon the epithelium cells, which line the respiratory passages, is to destroy their function and arrest secre-

tion altogether, or at least to such an extent as to produce inflammation and its consequences. A warm moist atmosphere, on the other hand, or what is called a "relaxing air", favours the vital processes of the parts with which it comes in contact, increasing secretion, relieving inflammation and congestion, and with it the harassing cough and constitutional disturbance, which largely depend upon these morbid conditions.

In persons of spare habit and irritable fibre, the effect of a removal to this kind of atmosphere, in every species of lung-disease to which they are liable, is always most beneficial; whilst on persons of a relaxed habit with copious expectoration, although they undoubtedly receive benefit from a change to the seaside, from its tonic and alterative influence upon their systems, yet when this subsides, which it usually does in two or three months, I have not observed that a residence on the coast produces such a decidedly beneficial influence. In such cases, I generally recommend them, if they come from the interior, and the neighbourhood be salubrious, to try again their native air. The above opinions on the influence of atmospheric vicissitudes on the system,

are the result of carefully recorded observations on this subject, which have extended over a period of ten years, but which are too lengthened for further notice here.

4. *Of the Horizontal Pressure of the Atmosphere or the Winds.* These need but a passing observation, notwithstanding their importance, which will be readily understood when we consider that the temperature of our bodies is about 98° or 100° and the air in winter 50°, 60°, or sometimes 70° below this; it is, therefore, highly desirable in phthisis, and other diseases in which the vital powers are low, that these should be avoided.

5. *Of the Perpendicular Pressure of the Atmosphere.* This, as is well known, is about 15lbs on the square inch, and supports a column of mercury of 30 inches. The fluctuations at Worthing are about two inches, representing an altered condition of pressure of about 1lb. on the square inch. The following are some of the more palpable effects which I have found produced on the human system in health and disease by diminished atmospheric pressure. I am not aware that these have ever been before noticed.

My attention was directed to this subject a few years ago, at which time I was recovering from a fracture of several of my ribs. The fall in the barometer was indicated by increased sensibility and pain at the injured parts, so that I could with certainty predict the state of the weather before rising in the morning. There is no other atmospheric change that could produce this effect; for the increased humidity of the air would have no influence upon parts covered by integument and muscle, and with altered temperature there was no agreement.

About three years ago I was away from home late in the evening, and returned in a heavy shower of rain; this brought on congestion and inflammation about the throat and tonsils, which, extending up the Eustachian tube to its narrow part, brought on by its occlusion partial deafness of the left ear. After several months of treatment this subsided, but during the period of recovery, with diminished atmospheric pressure, there was always an increase of the deafness. I attribute this to increased distension of the vessels of the Eustachian tube, closing the communication between the throat and ear. Diseased and injured bones also, especially near the surface, as the tibia and frontal bones, are

invariably painful with diminished atmospheric pressure.

During inflammation, the fibrous tissues also, as the sclerotic coat of the eye, are very much influenced by the fall in the barometer, as indicated by increased pain; and it is a common circumstance in phthisis pulmonalis for blood to transude from the ulcerated surfaces when the barometer is very low, giving a streaked appearance to the expectoration, which subsides as the atmospheric pressure is increased. Toothache, again, is generally augmented from the same cause, as well as the pain of chronic rheumatism, especially in joints but slightly covered.

In the *Healthy System*, the sense of oppression and lassitude which we generally feel on the approach of a thunder-storm, is mainly attributable to this cause; and the relief after the storm has passed by and the barometer has risen, is, I believe, caused entirely by the support given to the system by increased atmospheric pressure. The exhilarating influence, also, to many persons of a north and north-east wind is, no doubt, owing to the same, and the tendency to sleep is materially increased by diminished barometric pressure. This

effect in my own person has been so constant, that I cannot doubt, if observations are made by others, that it will be found to be invariable.

In support of this I may add, that I have an aged father, an octogenarian (now deceased), in whom I have constantly noticed an increased tendency to sleep to be coincident with the fall in the barometer. It is also a nautical axiom, that "a sailor always sleeps well in a storm." This apparent paradox is explained by the low barometric pressure which exists on these occasions; and that the repose of residents on the sea-coast, during the storms of the autumnal and vernal equinox, are not disturbed to the extent that might be expected, is attributable to the same cause. These observations, although not having strictly a reference to the climate of Worthing, have been introduced on account of their novelty, and often practical value.

6. *Of the Ozone?*—The constant prevalence of this principle at sea and on the coast when sea breezes prevail, its total absence in the interior of large continents, except during severe storms, the well-known purifying influence of these, and the superior salubrity of the former compared with

that of the latter, would lead us to infer that it is the grand agent intended by our Beneficent Creator to maintain the purity of the atmosphere, and thus to allow the oxygen to exert to the fullest extent its life-giving influence; that whilst plants, during their vital activity, absorb the carbonic acid from the atmosphere and prevent its noxious effects; so the ozone combines with the other products of animal and vegetable decomposition which is constantly going on, and thus, in conjunction with low ranges of temperature and abundant humidity, maintains that condition of the atmosphere which is found to be so conducive to salubrity. With respect to its producing any direct influence either upon the lungs or the system generally, I have only to say as of electricity, that we have no proof of this. It is, however, only reasonable to infer from the well-known properties both of ozone and chlorine, that if there be any, it is that of a gentle stimulant to the lungs and air-tubes during the process of respiration.

7. *Of the other Accidental Ingredients.* Chloride of sodium, as before stated, is found to exist largely in a sea-side atmosphere; this, doubtless, exerts a mild, stimulating effect on the lungs, and with the

iodine, an alterative, tonic, and stimulant influence on the system generally, increasing the secretions and excretions, and in this way producing such beneficial results in scrofula, as shown by the rapid disappearance of glandular swellings, and the healing of scrofulous ulcers from a change of residence to the sea-side. This, I consider, affords one of the best evidences of the value of a marine atmosphere in pulmonary consumption, which may be considered as an internal manifestation of the same disease, its destructiveness arising from its attacking an organ essential to life. One of the first and most constant effects of the sea air, (although it will cure a diarrhœa), is a slight relaxation of the bowels. This has been erroneously attributed to humidity, and the sea air called relaxing; it is, I believe, owing entirely to the increased appetite for food, the result of its stimulating influence upon the glandular system generally; from the same cause, also, the assimilative powers are increased, the blood improved in quality, and an arrest of tubercle takes place.

CHAPTER VIII.

The Applicability of the Climate of Worthing to the Cure and Alleviation of Disease.—Conclusion.

The applicability of the Climate of Worthing to the Cure and Alleviation of Disease.—From what has already been said of the nature of the climate of Worthing, on the one hand, and the effects of vicissitudes of the atmosphere upon the system, on the other, its sanative influence, and the diseases to which it is applicable, will be readily understood. From its small annual ranges of temperature,—being warm in winter and cool in summer, with quarterly, monthly, and daily ranges that correspond, and bearing a comparison in these respects with any on the coast; being also alike free from extreme dryness and extreme humidity; from its southern aspect; and the doubly sheltered position of its sea frontage or marine parade from the northerly winds, these being first diminished in

their force by the hills to the north and north-east,* and then by the almost uninterrupted line of buildings on the shore,—it may be considered to possess an atmosphere eminently adapted to establish the healing process in ulcerated lungs, enabling those who are afflicted with this disease to take almost constant exercise in the open air, and select the most convenient time and weather, and in that way securing the full and free oxygenation of the blood, and by this invigorating the system, improving the appetite and digestion, increasing the excretions, and restoring the vital action of every organ in the body, and thus giving the best chance of a restoration to health.

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* The question has more than once been asked, What is the degree of shelter which these hills give the town? To those who have resided on the north-east or north-west coast, and felt the piercing blasts of winter come upon them with unmitigated force, no other proof is needed of their sheltering influence; and those amongst us who recollect the hurricane of June the 2nd last, or the one that wrecked the "Lalla Rookh", in November 1850 (in which eleven of our brave fishermen were lost in their noble effort to render assistance), and many others from the south, would, I am persuaded, be unable to call to their memory a northerly wind of a similar character. From observations made upon this subject, I am enabled to state with tolerable precision, that the force of the winds from the north upon the town of Worthing, is reduced by these hills at least one half.

All who have had anything to do with this disease are aware of its terrible fatality, yet by a well-selected climate on the south coast the disease is frequently arrested, in other instances a cure more or less permanent accomplished, and in nearly every case the life of the patient is very much prolonged. I have seen more immediate and evident benefit derived in this disease, especially when associated with diarrhœa, from a change of air to the south coast in *summer* than in winter, the cool ocean breezes, loaded with ozone, operating like a charm in arresting the diarrhœa.

There are, however, other coast residences, doubtless, equally appropriate for the summer, whereas the sheltered places adapted for the *winter* are very few, and there is one point on which Worthing stands unrivalled, viz., the extent of its exercising ground. From the sea to the hills the country is a perfect level, and invalids are enabled to take a great variety of rides and drives, should their health permit, without passing into a different atmosphere. There are many places so pent up as to present no variety in this respect, without encountering almost another climate. Nor is this

the only advantage of this state of things, for they are also enabled to avoid, to use the words of Dr. Cotton, "the daily sight of others more advanced in the same disease, which very often tells sadly on the spirits."

The country, also, between the sea and the hills, which, as before stated, extends to about a mile and a half, and a mile to the north of the town, and the absence, therefore, of reflected heat, renders it equally appropriate as a residence throughout the year, a circumstance of great importance, for it is often either inconvenient or undesirable for invalids to change their homes with the seasons; in diseases of the heart, also, a level exercising ground is of the utmost consequence.

For the same reasons as have been enumerated above, the climate of Worthing is most beneficial in many other diseases of the lungs; in hooping-cough it is almost a specific, its tonic and alterative effect restoring nervous influence, and the increased humidity allaying cough and irritation; in chronic bronchitis and spasmodic asthma it is especially useful; in chronic rheumatism, also, and renal diseases, from its soft and temperate atmosphere promoting a free excretion from the skin, it is well adapted.

These statements are not made without evidence of great benefit derived in these cases. In every variety of scrofula, and in all diseases associated with debility, the value of a sea-side residence and sea-bathing are well known; to invalids, also, on their return from hot climates; and, lastly, to aged persons and children it is peculiarly appropriate.

Conclusion.—When the nature of the process of respiration is borne in mind; its unceasing action; that there are from fourteen to eighteen respirations in each minute of time; that about twenty cubic inches of air are exchanged at each respiration; that this is brought into contact with such delicate structures as the lungs; and that these when diseased are in a state of exalted sensibility; and also, that the immediate object of respiration is to bring the air into relation with the blood itself,—enough, I trust, has been said to show the importance of those differences, however minute they may appear, which constitute the varieties of climate, and also the cause of the beneficial influence which one may exert over that of another.

Nor can the practical value of meteorological science be doubted in the treatment of those diseases which are especially benefited by climate, an

acquaintance with which would appear to be as necessary as acoustics in diseases of the ear, or optics in those of the eye; it may, at least, be affirmed, that it is an important aid in the treatment of these, and without which our best directed efforts will often fail.

METEOROLOGICAL TABLES.

1859.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction. N.	E.	S.	W.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.	Ozone.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.	
January	30·215	50·5	31·0	19·5	44·2	36·7	7·5	41·8	36·8	·221	2·5	0·5	84	558	1·5	7	2	13	9	6·8	18	0·8	4·0
February	29·985	52·5	32·5	20·0	47·4	38·5	8·9	43·4	37·0	·228	2·7	0·5	80	552	1·1	4	1	9	14	4·9	18	2·5	5·0
March	29·984	59·5	32·8	26·7	49·7	40·6	9·1	45·9	42·7	·275	3·1	0·4	89	549	2·1	6	0	7	18	6·7	15	1·5	4·3
The Quarter..	30·061	59·5	31·0	28·5	47·1	38·6	8·5	43·7	38·8	·241	2·8	0·5	84	553	1·6	17	3	29	41	6·1	51	4·8	4·4
April	29·719	61·0	31·5	29·5	51·4	39·9	11·5	47·2	39·3	·241	2·8	0·9	75	543	3·2	4	7	9	10	5·4	14	2·3	6·0
May	29·874	69·0	37·5	31·5	58·5	44·6	13·9	52·5	47·9	·334	3·8	0·7	84	540	1·8	16	10	4	1	5·2	10	2·3	4·9
June	29·840	74·9	45·8	29·1	67·8	52·6	15·2	60·7	52·4	·395	4·4	1·5	74	530	1·4	9	6	9	6	4·8	9	2·0	5·6
The Quarter..	29·811	74·9	31·5	43·4	59·2	45·7	13·5	53·5	46·5	·323	3·7	1·0	78	538	2·1	29	23	22	17	5·1	33	6·6	5·5
July	30·083	80·2	50·5	29·7	76·1	58·2	17·9	67·0	59·6	·509	5·5	1·8	77	527	1·3	3	6	12	10	3·3	7	1·4	4·9
August	29·868	74·9	47·9	27·0	68·8	55·9	12·9	63·0	55·6	·443	4·9	1·5	77	528	1·7	5	6	8	12	5·7	5	0·5	5·0
September ..	29·874	67·8	50·5	17·3	61·2	53·9	7·3	57·4	49·9	·359	4·0	1·2	77	516	2·3	8	6	14	2	6·0	22	3·6	5·6
The Quarter..	29·942	80·2	47·9	32·3	68·7	56·0	12·7	62·5	55·0	·434	4·8	1·5	77	527	1·8	16	18	34	24	5·0	34	5·5	5 2
October	29·689	71·2	30·5	40·7	58·2	50·2	8·0	54·2	52·4	·394	4·4	0·3	93	534	1·3	4	8	9	11	7·0	17	4·1	2·0
November ..	29·978	57·9	32·2	25·7	48·6	39·1	9·5	43·6	42·3	·270	3·1	0·1	98	552	1·6	7	8	8	7	4·9	14	4·8	2·7
December ..	29·523	51·9	20·9	31·0	42·8	34·2	11·6	38·8	34·6	200	2·3	0·4	86	549	1·6	10	5	8	7	7·0	17	3 7	3·0
The Quarter..	29·730	71·2	20·9	50·3	49·9	41·2	9·7	45·5	43·1	·288	3·3	0·3	92	545	1·5	21	21	25	25	6·3	48	12·6	2·6
Winter 6 mo..	29·895	71·2	20·9	50·3	48·5	39·9	9·1	44·6	40·9	·264	3·0	0·4	88	549	1·5	38	24	54	66	6·2	99	17·4	3·5
Summer 6 mo.	29·876	80·2	31·5	48·7	63·9	50·8	13·1	58·0	50·7	·371	4·2	1·2	78	533	1·9	45	41	56	41	5·0	67	12·1	5·3
The Year	29·885	80·2	20·9	59·3	56·2	45·3	11·1	51·3	45·8	·321	3·6	0·8	83	511	1·7	83	65	110	107	5·6	166	29·5	4·4

1858.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Temperature of the Air. Lowest.	Temperature of the Air. Range.	Temperature of the Air. Mean. Of all the highest.	Temperature of the Air. Mean. Of all the lowest.	Temperature of the Air. Mean. Daily range.	Mean temperature. Air.	Mean temperature. Dew point.	Vapour. Elastic force.	Vapour. In a cubic foot of air. Mean weight.	Vapour. In a cubic foot of air. Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Wind. Direction. N.	Wind. Direction. E.	Wind. Direction. S.	Wind. Direction. W.	Mean amount of cloud.	Rain. No. of days it fell.	Rain. Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·333	49·0	25·0	24·0	45·2	35·6	9·6	39·9	37·1	·222	2·6	0·3	91	563	0·8	7	4	6	14	5·9	7	0·8
February	29·958	49·5	27·0	22·5	42·9	33·8	9·1	38·2	34·5	·199	2·3	0·4	87	558	1·1	8	14	5	1	4·9	7	1·4
March	29 889	59·6	28·7	30·9	45·8	36·1	9·7	41·4	37·7	·228	2·6	0·4	86	553	0·8	9	9	5	8	4·5	6	0 6
The Quarter..	30·053	59·6	25·0	34·6	44·6	35·2	9·5	39·8	36·4	·216	2·5	0·4	88	558	0·9	24	27	16	23	5·1	20	2·8
April........	29·914	64·4	32·8	31·6	54·1	42·0	12·1	48·0	41·7	·263	3 0	0·8	79	517	0·8	5	13	7	5	5·8	11	2·5
May	29·937	66·8	38·7	28·1	56·5	46·3	10·2	51·8	47·3	·326	3·7	0·7	85	542	0·8	5	6	9	11	5·0	8	0·9
June	30·057	76 0	51·8	24·2	68·1	55·8	12·3	62·5	57·1	·469	5·2	1·1	88	532	0·6	6	8	9	7	3·1	4	0·6
The Quarter..	29·969	76·0	32·8	43·2	59·6	48 0	11·5	54·1	48·7	·353	4·0	0·9	84	564	0·7	16	27	25	23	4·6	23	4·0
July	29·929	71·0	46·0	25·0	67·7	54·5	13·2	60·4	54·8	·430	4·8	1·1	82	532	0·8	8	1	4	18	4·6	10	2·1
August	30·015	79·5	48·5	31·0	70 0	56·0	14·0	61·8	54·9	·432	4·8	1·4	78	532	0·2	10	6	4	11	3·3	6	1·7
September ..	30·010	75·6	48·0	27·6	67·7	56·7	11·0	61·5	56·0	·448	5·0	1·2	83	532	1·0	7	6	6	11	5·3	9	1·1
The Quarter..	29·985	79·5	46·0	33·5	68·5	52·4	12·7	61·2	55·2	·437	4·9	1·2	81	532	0·7	25	13	14	40	4·4	25	5·2
October	29·996	65·4	36·8	28·6	60·0	47·7	12·3	52·9	47·5	·330	3·7	0 8	82	542	1·1	9	8	6	8	—	11	1·6
November ..	29·882	51·8	26·0	25·8	46·9	36·9	10·0	41·9	37·8	·228	2·6	0·5	86	553	1·4	9	13	4	4	—	10	1·6
December ..	29·937	51·5	33·5	18·0	46·1	38 2	7·9	42·5	40·1	·248	2·9	0·3	91	552	1·5	7	3	9	12	7·5	18	3·6
The Quarter..	29·938	65·4	26·0	39·4	50·7	40·9	10·1	45·8	41·8	·269	3·1	0·5	86	549	3 3	25	24	19	24	—	39	6·8
Winter 6 mo..	29·995	65·4	25·0	40·4	47·7	38·1	9·8	42·8	39·1	·243	2·8	0·4	87	553	2·1	49	51	30	63	—	59	9·6
Summer 6 mo.	29·927	79·5	32·8	46·7	64·0	50·2	12·1	57·6	51·9	·395	4·5	1·0	82	548	0·7	41	40	44	47	4·5	48	9·2
The Year	29·961	79·5	25·0	54·5	55·9	44·2	10·9	50·2	45·5	·319	3·6	0·7	85	551	1·4	90	91	74	110	—	107	18·8

1857.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction. N.	E.	S.	W.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	29·780	49·0	20 0	29·0	42·1	31·7	10·4	37·6	35·2	·205	2·4	0·2	91	555	0·9	13	3	1	14	7·9	20	1·8
February	30·096	47·9	23·9	24·0	43 8	33·5	10·3	40·0	39·0	·228	2·6	0·3	93	558	0·7	7	6	6	8	5·7	5	0·2
March	29·881	52·8	26·1	26·4	47·2	35·8	11·4	41·6	38·2	·231	2·6	0·4	89	552	0·5	6	9	8	8	5·9	10	1·5
The Quarter..	29·919	52·8	20·0	32·8	44·4	33·7	10·7	39·7	34·1	·221	2·5	0·3	91	555	0·7	26	18	15	30	6·5	35	3·5
April........	29·778	57·0	30·0	27·0	51·5	39·7	11·8	44·0	42·6	·273	3·1	0·2	95	547	0·4	8	7	6	9	5·5	17	1·5
May	29·916	66·0	34·0	32·0	59·7	45·6	14·1	51·7	47·7	·331	3·7	0·7	87	545	0·6	6	13	11	1	5·3	5	1·0
June	29·991	76·6	42·8	33·8	67·7	51·7	16·0	59·5	54·5	·425	4 7	1·0	84	534	0·9	2	11	10	7	3·2	6	2·1
The Quarter..	29·895	76·6	30·0	46·6	59·6	45·7	14·0	51·7	48·3	·343	3·8	0·6	89	542	0·6	16	31	27	17	4·7	28	4·6
July	30·008	75·7	44·5	31·2	69·3	55·0	14·3	61·5	57·8	·479	5·2	0·8	88	532	0·7	2	3	9	17	4·0	8	1·0
August	29·974	77·2	40·6	27·6	71·3	56·7	14·6	62·8	58·8	·496	5·4	0·9	80	530	0·6	5	9	7	10	3·4	6	4·4
September ..	29·938	71·7	45·4	26·3	66·3	53·4	12·9	60·0	55·3	·438	4·9	0·6	85	532	0·6	6	4	10	10	3·9	14	3 0
The Quarter..	29·973	77·2	44·5	26·3	69·0	55·0	13·9	61·4	57·3	·471	5·2	0·9	84	531	0·6	13	16	26	37	3·8	28	8·4
October	29·876	65·6	40·4	25·2	58·9	51·2	7·7	55·7	50·7	·371	4·4	0·8	90	536	0·9	7	9	6	9	6·2	17	4·4
November ..	30·111	60·7	37·5	23·2	52·3	45·9	6·4	47·3	45·2	·303	3·4	0·5	87	549	0·7	14	9	6	1	7·0	12	2·6
December ..	30·313	57·4	35·5	21·9	50·2	44·6	5·6	48·0	43·8	·285	3·3	0·5	86	553	0·6	4	4	12	11	6·7	10	0·6
The Quarter..	30·100	65·6	35·5	30·9	53·8	47·2	6·6	50·3	49·9	·320	3·6	0·6	88	546	0·7	25	22	24	21	6·6	39	7·6
Winter 6 mo..	30·009	65·6	20·0	45·6	49·1	40·4	8·6	45·0	41·5	·271	3·1	0·5	89	551	0·7	51	40	39	51	6·6	74	11·1
Summer 6 mo.	29·934	77·2	30·0	47·2	64·3	50·3	14·0	56·6	52·8	·407	4·5	0·7	86	536	0·6	29	47	53	54	4·3	56	13·0
The Year	29·922	77·2	20·0	57·2	56·7	45 2	11·3	50·8	47·1	·339	3·8	0·6	88	544	1·3	80	87	92	105	5·5	130	24·1

1856.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Temperature of the Air. Lowest.	Temperature of the Air. Range.	Mean. Of all the highest.	Mean. Of all the lowest.	Mean. Daily range.	Mean temperature. Air.	Mean temperature. Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	In a cubic foot of air. Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction. N.	Direction. E.	Direction. S.	Direction. W.	Mean amount of cloud.	Rain. No. of days it fell.	Rain. Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	29·602	49·9	25·8	24·1	43·5	36·8	6·7	40·4	38·0	·228	2·7	0·3	92	549	0·9	8	7	10	6	6·3	21	2·6
February	30·056	50·8	30·6	20·2	44·7	38·0	6·7	41·4	36·7	·218	2·6	0·5	84	556	0·7	7	7	7	6	7·6	15	1·6
March	30·106	50·7	28·9	21·8	46·3	34·1	12·2	39·9	37·8	·227	2·8	0·2	93	558	0·5	10	16	3	2	4·8	3	1·2
The Quarter..	29·988	50·8	25·8	25·0	44·8	36·3	8·5	40·6	37·8	·224	2·7	0·3	90	554	0·7	25	30	20	14	6·2	39	5·4
April	29·714	56·3	34·7	21·6	51·9	40·9	11·0	44·2	38·6	·234	2·7	0·6	80	546	0·8	6	12	5	7	5·5	14	3·5
May	29·791	56·2	33·0	33·2	55·8	43·8	12·0	48·6	43·6	·284	3·2	0·7	83	542	0·9	8	9	7	7	6·4	19	3·3
June	30·046	72·0	48·8	27·2	65·1	52·1	13·0	56·9	50·8	·371	4·1	1·1	80	539	0·7	8	4	5	12	4·1	9	2·3
The Quarter..	29·884	72·0	33·0	39·0	57·6	45·6	12·0	49·9	44·3	·296	3·3	0·8	81	542	0·8	22	25	17	26	5·3	42	9·1
July	29·990	75·0	46·5	28·5	66·4	54·8	11·6	59·1	54·3	·422	4·8	0·8	85	534	0·7	11	3	1	15	4·0	14	1·7
August	29·877	81·1	45·7	35·4	69·9	59·2	10·7	63·5	57·8	·479	5·2	1·2	82	528	0·8	5	15	4	7	3·6	13	1·5
September ..	29·802	68·3	41·6	26·7	62·3	50·3	12·0	56·0	51·0	·374	4·2	0·8	83	534	0·4	12	5	4	8	4·6	0	4·4
The Quarter..	29·890	81·1	41·6	39·5	66·2	54·8	11·4	59·5	34·4	·425	4·7	0·7	83	532	0·6	28	23	9	30	4·1	27	7·6
October	30·126	64·9	37·5	27·4	58·7	48·7	10·0	54·0	49·6	·356	4·0	0·7	85	543	0·3	9	12	5	4	6·7	13	2·4
November ..	30·048	55·2	22·8	32·4	47·6	36·4	11·2	42·7	36·9	·219	2·5	0·6	81	554	0·6	15	5	0	10	6·6	14	1·4
December ..	29·808	55·6	21·5	34·1	44·5	35·4	9·1	41·0	39·1	·238	2·7	0·3	93	551	0·8	10	2	5	14	8·0	19	3·1
The Quarter..	29·994	64·9	21·5	43·4	50·3	40·2	10·1	45·9	41·9	·271	3·1	0·5	86	549	0·6	34	19	10	28	7·1	46	6·9
Winter 6 mo..	29·991	64·9	21·5	43·4	47·5	38·2	9·3	43·2	39·8	·247	2·9	0·4	88	551	0·6	59	49	30	42	6·6	85	12·3
Summer 6 mo.	29·887	81·1	33·0	48·0	61·9	52·8	11·7	54·7	39·3	·361	4·0	0·8	82	537	0·7	50	48	26	56	3·3	69	16·7
The Year	29·939	81·1	21·5	59·6	54·7	45·1	10·5	49·0	39·5	·304	3·4	0·6	85	544	0·7	109	97	56	98	4·9	154	29·0

METEOROLOGICAL TABLE. WORTHING.

1855.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.					in.
January	30·150	51·4	22·5	28·9	39·4	33·7	5·7	36·5	32·8	·205	2·4	0·3	88	559	0·9	NE.	7·0	6	0·2
February	29·720	44·5	18·0	26·5	34·9	27·2	7·7	30·8	25 8	·158	1·9	0·4	84	558	1·0	NE.	6·1	11	1·0
March	29·681	44·7	26·8	20·9	43·0	34·2	8·8	37·9	34·8	·220	2·6	0·3	89	549	1·0	NE.	6·1	14	1·8
The Quarter..	29 850	51·4	18·0	33·4	39·1	31·7	7·4	31·7	31·1	·194	2·3	0·3	87	555	1·0	—	6·4	31	3·0
April	30·081	62·6	30·3	32·3	52·5	37·1	15·4	43·8	37·4	·241	2·8	0·7	80	519	1·0	variable.	3·5	2	0·1
May	29·828	73·4	32·0	41·4	55·3	43·7	11·6	47·9	42·0	·284	3·3	0·7	81	540	0·9	do.	3·5	11	2·8
June	30·118	73·9	40·7	33·2	62·9	51·0	11·9	55·1	49·0	·361	4·1	0·9	81	537	1·3	N. NW. & NE.	5·7	8	1·3
The Quarter..	30·009	73·9	30·3	43·6	56·9	43·9	13·0	48·9	42·8	·295	3·4	0·8	81	542	3·1	—	4·2	21	4·2
July	29·769	79·0	43·7	35·3	73·3	54·1	19 2	62·1	55·5	·444	5·0	1·3	80	523	—	SW.	7·0	10	5·0
August	29·874	79·0	47·3	31·7	72·9	53·7	19·2	62·1	53·9	·423	4·7	1·5	76	525	—	SW.	5·9	10	1·1
September ..	29·966	78·2	34·1	44·1	68·5	47·7	20·8	57·1	50 5	·378	4·3	1·1	80	532	—	NE. & SW.	5·4	6	1·1
The Quarter..	29·870	79 0	34·1	44 9	71·6	51·8	19·7	60·4	53·3	·415	4·7	1·3	79	527	—	—	6·1	26	7·2
October	29·640	64·1	37·7	26·4	57·8	50·2	7·6	53·4	49·2	·364	4·1	0·6	87	530	1·3	NW. & SW.	7·7	28	5·7
November ..	29·964	53·0	29·4	23·6	46·1	38·4	7·7	42·1	38·9	·253	3·0	0·3	89	549	1·0	NE. & E.	7·3	18	2·0
December ..	29·880	49·0	17·5	31·5	41·6	32·7	8·9	37·7	33·0	·205	2·4	0·4	84	553	1·2	NW. & SW.	6·8	15	1·3
The Quarter..	29 828	64·1	17·5	46·6	48·5	40 4	8·1	44·4	40·4	·274	3·2	0·4	87	544	1·2	—	7·3	61	9·0
Winter 6 mo..	29·839	64·1	17·5	46·6	43·8	36·1	7·7	38·1	35·8	·234	2·8	0·4	87	499	1·1	—	6·8	92	12·0
Summer 6 mo.	29 939	79 0	30·3	48·7	64·2	47·8	16·3	54·6	48·1	·355	4·0	1·0	80	534	—	—	5·2	47	11·4
The Year	29 889	79·0	17·5	61·5	54·0	42 0	12·0	46·3	41·9	·295	3·4	0·7	84	516	—	—	6·0	139	23·4

1854.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.					in.
January	29·757	48·8	23·4	25·4	43·2	37·2	6·0	40·2	38·0	·247	2·9	0·2	93	548	1·4	SW.	7·2	19	2·7
February	30·239	51·5	27·6	23·9	44·8	36·6	8·2	40·2	36·5	·234	2·7	0·4	88	556	1·5	NW.	5·1	11	0·9
March	30·336	56·5	28·5	28·0	48·5	37·9	10·6	42·4	36·6	·251	2·9	0·4	88	556	1·2	variable.	5·1	5	0·1
The Quarter..	30·111	56·5	23·4	33·1	45·4	37·2	8·3	40·9	37·7	·244	2·8	0·3	90	553	1·4	—	5·8	35	3·7
April	30·119	63·1	32·3	30·8	56·2	42·8	13·4	48·4	39·9	·263	3·0	1·0	75	545	1·3	NE. E. & SW.	3·2	3	0·2
May	29·823	62·6	38·8	23·8	57·7	45·8	11·9	50·2	44·8	·312	2·6	0·7	83	537	1·2	SW.	4·5	15	3·1
June	29·872	68·0	40·5	27·5	62·7	51·5	11·2	55·1	49·6	·368	4·2	0·9	83	533	1·3	SW. & NW.	7·8	12	2·0
The Quarter..	29·938	68·0	32·3	35·7	58·9	46·7	12·2	51·2	44·8	314	3·3	0·9	80	538	1·3	—	5·2	30	5·3
July	29·940	80·5	50·2	30·3	67·8	56·2	11·6	60·2	54·1	·431	4·8	1·1	82	529	0·8	SW.	5·8	8	0·8
August	30·034	73·0	47·5	25·5	67·4	54·9	12·5	59·6	53·1	·345	4·7	1·1	80	530	0·7	SW.	4·7	10	1·4
September ..	30·161	71·6	43·8	27·8	64·9	52·9	12·0	58·4	50·3	·377	4·2	1·3	76	534	1·1	NE. & SW.	2·1	6	1·3
The Quarter..	30 045	80·5	43·8	36·7	66·7	54·7	12·0	59·4	52·5	·384	4·6	1·2	79	534	0·9	—	4·2	24	3·5
October	29·856	63·4	36·2	27·2	56·3	45·2	11·1	50·3	45·9	·324	3·7	0·6	86	538	1·1	NW. & NE.	4·6	14	4·1
November ..	29·832	57·0	28·8	28·2	46·9	37·0	9·9	41·7	38·8	·254	3·0	0·3	90	547	0·7	NW. & NE.	7·3	13	1·6
December ..	29·948	52·2	29·0	23·2	46·3	37·4	8·9	42·0	38·1	·248	2·9	0·4	87	548	1·3	NW. & SW.	5·2	18	1·9
The Quarter..	29·879	63·4	28·8	34·6	49·8	39·9	10·0	43·7	40·9	·275	3·2	0·4	88	544	1·0	—	5·7	45	7·6
Winter 6 mo..	29·990	63·4	23·4	40·0	47·7	38·6	9·1	42·3	39·3	·259	3·0	0·3	89	548	1·2	—	5·7	80	11·3
Summer 6 mo.	29·991	80·5	32·3	58·2	62·8	50·7	12·1	55·3	48·6	·349	3·9	1·0	80	536	1·1	—	4·7	54	8·8
The Year	29·991	80·5	23·4	57·3	55·2	47·7	10·6	48·8	43·9	·304	3·5	0·6	84	542	1·2	—	5·2	134	20·1

1853.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.					in.
January	29·735	52·0	33·8	18·2	46·9	40·6	6·3	43·8	40·1	·275	3·1	0·4	88	542	2·2	SW.	4·1	20	3·9
February	29·652	44·2	26·0	18·2	39·3	31·4	7·9	34·7	30·3	·187	2·2	0·4	86	552	1·6	N.	4·6	14	0·7
March	29·925	49·6	25·0	24·6	43·9	33·4	10·5	37·7	34·0	·214	2·5	0·4	88	554	1·1	NE.	3·3	16	1·5
The Quarter..	29·771	52·0	25·0	27·0	43·3	35·1	8·2	38·7	34·8	·228	2·6	0·4	87	549	1·6	—	4·0	50	6·1
April	29·847	55·5	34·8	20·2	51·0	42·0	9·0	45·2	39·8	·261	3·0	0·6	83	544	1·4	SW. & NW.	5·0	18	3·2
May	29·868	73·0	35·0	38·0	59·2	46·6	12·6	51·5	45·1	·216	3·6	0·9	81	537	1·6	NE.	3·6	10	1·7
June	29·875	72·0	43·0	29·0	63·4	52·5	10·9	56·0	51·5	·393	4·5	0·7	86	532	1·5	SW.	4·9	16	2·2
The Quarter..	29·863	73·0	34·8	38·2	57·9	47·0	10·8	50·9	45·5	·323	3·7	0·7	83	538	1·5	—	4·5	44	7·1
July	29·890	73·8	49·3	24·5	64·2	56·3	7·9	58·5	54·6	·438	4·9	0·7	88	529	1·7	SW.	5·9	18	2·9
August	29·938	69·8	50·2	19·6	65·2	55·6	9·6	59·2	53·6	·422	4·8	1·0	83	529	1·2	SW. & NE.	5·0	11	2·6
September ..	29·972	68·9	41·2	27·7	62·1	51·2	10·9	55·8	49·6	·370	4·2	0·9	82	534	1·3	SW. & NE.	4·8	15	2·1
The Quarter..	29·933	73·8	41·2	32·6	63·8	54·4	9·5	57·8	52·6	·410	4·6	0·9	84	531	1·4	—	5·2	44	7·6
October	29·690	60·2	38·6	21·6	56·3	49·0	7·3	52·2	47·6	·345	3·9	0·7	85	532	1·9	SW. S. & NE.	6·8	24	7·6
November ..	30·097	57·5	30·3	27·2	47·9	41·2	6·7	44·3	42·0	·284	3·3	0·3	93	549	1·3	NE. NW. & S.	5·2	7	1·2
December ..	29·897	47·1	25·5	24·6	38·8	33·0	5·8	36·2	32·5	·204	2·4	0·3	88	555	1·5	NW. & SW.	6·0	13	0·5
The Quarter..	29·895	60·2	25·5	37·7	47·7	41·1	6·6	44·2	40·7	·278	3·2	0·4	89	545	1·6	—	6·0	44	9·3
Winter 6 mo..	29·833	60·2	25·0	37·7	45·5	38·1	7·4	41·5	37·7	·253	2·9	0·4	88	547	1·6	—	5·0	94	15·4
Summer 6 mo.	29·840	73·8	34·8	39·0	60·8	50·7	10·1	54·3	49·0	·366	4·1	0·8	83	534	1·4	—	4·8	88	14·7
The Year	29·837	73·8	25·0	51·3	53·1	44·4	8·7	47·9	43·3	·309	3·5	0·6	85	540	1·5	—	4·9	182	30·1

1858.	Mean pressure of the atmosphere.	Temperature of the Air.						Mean temperature.		Vapour.			Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind.					Mean amount of cloud.	Rain.	
		Highest.	Lowest.	Range.	Mean. Of all the highest.	Mean. Of all the lowest.	Mean. Daily range.	Air.	Dew point.	Elastic force.	In a cubic foot of air. Mean weight.	In a cubic foot of air. Short of saturation.			Estim. strength.	Direction. N.	Direction. E.	Direction. S.	Direction. W.		No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·247	53·0	26·0	27·0	47·3	38·5	8·8	42·9	37·6	·227	2·6	0·6	82	558	—	6	7	8	10	—	11	1·5
February	29·849	53·0	29·0	24·0	44 7	36·4	8·3	40·6	34·9	·203	2·4	0·6	81	553	—	3	20	3	2	—	9	1·4
March	29·841	64·0	27·0	37·0	49·6	38·7	10·9	44·1	38·4	·233	2·7	0·6	80	549	—	5	11	3	12	—	9	1·3
The Quarter..	29·979	64·0	26·0	38·0	47·2	37·9	9·0	42·6	37·0	·221	2·6	0·6	81	553	—	14	38	14	24	—	29	4·2
April	29·824	66·0	32·0	34·0	55·1	44·5	10·6	49·8	43·8	·288	3·3	0·8	81	542	—	4	14	5	7	—	12	2·9
May	29·818	71·0	39·0	32·0	58·5	47·0	11·5	52·7	48·7	·341	3·9	0·6	87	539	—	6	8	7	10	—	11	1·6
June	—	82·0	51·0	31·0	69·9	57·2	12·7	63·5	57·1	·466	5 2	1·3	80	527	—	4	3	6	17	—	4	1·2
The Quarter..	—	82·0	32·0	50·0	61·2	49·6	11·6	55·0	49·0	·366	4·1	0·9	83	536	—	14	25	18	34	—	27	5·7
July	29·889	73·0	50·0	23·0	66·5	65·2	11·3	60·9	55·9	·447	5·0	1·0	84	530	—	8	5	4	14	—	12	3·1
August	29·947	77·0	50·0	27·0	68·5	57·4	11·1	62·9	58·8	·497	5·4	0·9	87	529	—	5	6	4	16	—	12	1·6
September ..	30·005	75·0	50·0	25·0	63·4	58·3	5·1	60·9	58·3	·488	5·4	0·6	90	532	—	4	4	10	12	—	16	2·1
The Quarter..	29·947	77·0	50·0	27·0	66·1	60·3	9·2	61·6	57·7	·477	5·3	0·8	87	530	—	17	15	18	42	—	40	6·8
October	29·942	66·0	37·0	29·0	58·8	49·6	9·2	54·2	50·6	·369	4·2	0·6	88	539	—	6	9	7	9	—	14	2·3
November ..	29·780	55·0	31·0	24·0	48·4	40·4	8 0	44·4	39·0	·238	2·7	0·6	81	547	—	7	16	4	3	—	13	2·1
December ..	29·838	54·4	36·0	18·0	48·0	41·1	6·9	44·6	40·5	·252	2·9	0·5	86	548	—	4	6	7	16	—	20	3·7
The Quarter..	29·853	66·0	31·0	35·0	51·7	43·7	8·0	47·7	43·4	·286	3·3	0·6	85	545	—	17	31	18	28	—	47	8·0
Winter 6 mo..	29·916	66·0	26·0	40·0	49·4	40·8	8·5	45·1	40·2	·253	3·0	0·6	83	549	—	31	69	32	52	—	76	12·2
Summer 6 mo.	—	82·0	32·0	50·0	63·6	54·9	10·4	58·3	53·8	·421	4·7	0·8	85	533	—	31	40	36	76	—	67	12·5
The Year	—	82·0	26·0	56·0	56·5	47·8	9·5	51·7	47·0	·337	3·8	0·7	84	541	—	62	109	68	128	—	143	24·7

1858.	Mean pressure of the atmosphere.	Temperature of the Air: Highest.	Temperature of the Air: Lowest.	Temperature of the Air: Range.	Temperature of the Air: Mean: Of all the highest.	Temperature of the Air: Mean: Of all the lowest.	Temperature of the Air: Mean: Daily range.	Mean temperature: Air.	Mean temperature: Dew point.	Vapour: Elastic force.	Vapour: In a cubic foot of air: Mean weight.	Vapour: In a cubic foot of air: Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind: Estim. strength.	Wind: Direction: N.	Wind: Direction: E.	Wind: Direction: S.	Wind: Direction: W.	Mean amount of cloud.	Rain: No. of days it fell.	Rain: Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·286	54·3	23·8	30·5	46·7	37·0	9·7	42·0	37·5	·225	2·6	0·5	85	559	0·8	8	4	9	10	7·1	15	0·5
February	29·877	55·0	26·5	28·5	44·1	35·9	8·2	40·2	36·6	·216	2·5	0·4	88	544	0·9	8	12	6	2	7·8	15	1·3
March	29·899	58·1	26·8	31·3	48·7	34·9	13·8	42·5	37·0	·220	2·6	0·6	82	552	0·6	11	7	6	7	5·5	12	0·8
The Quarter..	30·021	58·1	23·8	34·3	46·5	35·6	10·6	41·6	37·0	·220	2·6	0·5	85	555	0·8	27	23	21	19	1·8	42	2·6
April	29·847	64·6	32·4	32·2	53·7	41·3	12·4	47·8	42·7	·275	3·2	0·6	84	545	0·7	9	12	5	4	6·0	14	4·0
May	29·881	72·5	35·4	47·1	59·9	43·4	16·5	52·3	44·2	·290	3·3	1·1	74	510	0·9	7	6	10	8	5·3	17	2·3
June	30·035	78·0	47·2	30·8	70·2	52·5	17·7	61·4	52·8	·400	4·5	1·6	74	533	0·2	14	9	5	2	5·6	6	0·9
The Quarter..	29·921	78·0	32·4	36·7	61·3	45·7	15·5	53·8	46·6	·322	4·0	1·1	77	529	0·6	30	27	20	14	5·6	37	7·2
July	29·919	78·6	47·7	30·9	70·0	53·4	16·6	60·1	50·4	·380	4·2	1·6	73	532	0·6	11	6	10	4	7·3	15	3·2
August	29·995	78·7	47·7	31·3	70·0	54·4	15·6	61·1	51·8	·382	4·3	1·7	72	532	0·6	10	7	9	5	5·0	11	0·8
September ..	29·935	71·4	45·7	25·7	67·4	55·9	12·4	60·7	54·9	·432	4·8	1·1	82	532	0·8	12	7	9	2	7·9	17	1·7
The Quarter..	29·950	78·7	45·7	33·7	69·1	54·6	14·9	60·6	52·7	·398	4·4	1·5	76	532	0·7	33	20	28	11	6·7	43	5·7
October	29·932	67·0	33·0	34·0	57·6	46·6	11·0	51·2	46·1	·314	3·5	0·7	83	542	0·7	14	6	6	5	6·7	12	2·1
November ..	29·786	56·4	28·4	28·0	48·1	39·2	8·9	43·4	38·8	·236	2·7	0·5	84	549	1·3	7	16	5	2	6·2	11	3·5
December ..	29·860	55·4	33·7	21·7	49·2	40·9	8·3	45·2	40·9	·256	2·9	0·5	85	548	0·9	6	5	7	13	7·5	23	3·5
The Quarter..	29·859	67·0	28·4	38·6	51·6	42·2	9·4	46·6	41·9	·269	3·0	0·6	84	546	1·0	27	27	18	20	6·8	46	9·1
Winter 6 mo. .	29·940	67·0	23·8	43·2	49·6	38·9	10·0	44·1	39·4	·244	2·8	0·6	84	550	0·9	54	50	39	39	6·8	88	11·7
Summer 6 mo.	29·935	78·7	32·4	46·3	60·2	50·1	15·2	57·4	49·6	·360	4·2	1·3	77	538	0·6	63	47	48	25	6·2	80	12·9
The Year	29·937	78·7	23·8	54·9	54·6	44·5	12·6	50·6	44·5	·302	3·5	1·0	80	540	0·8	117	97	87	64	6·5	168	24·6

1858.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Temperature of the Air. Lowest.	Temperature of the Air. Range.	Mean. Of all the highest.	Mean. Of all the lowest.	Mean. Daily range.	Mean temperature. Air.	Mean temperature. Dew point.	Vapour. Elastic force.	Vapour. In a cubic foot of air. Mean weight.	Vapour. In a cubic foot of air. Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Wind. Direction. N.	Wind. Direction. E.	Wind. Direction. S.	Wind. Direction. W.	Mean amount of cloud.	Rain. No. of days it fell.	Rain. Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·171	51·9	20·9	31·0	43·8	31·7	12·1	37·5	33·8	·194	2·2	0·4	86	563	—	5	3	11	12	5·6	5	0·7
February	29·841	52·8	23·5	29·3	41·8	29·8	12·0	34·6	30·4	·169	2·0	0·3	84	560	—	8	15	5	3	5·1	6	1·7
March	29·765	68·7	23·6	45·1	50·7	33·6	17·1	41·4	34·6	·201	2·3	0·7	78	551	—	7	5	4	15	5·4	8	0·9
The Quarter..	29·926	68·7	20·9	47·8	45·4	31·7	13·7	37·8	32·9	·282	2·2	0·5	83	558	—	20	23	20	30	5·4	19	3·3
April	29·779	76·0	27·2	48·8	57·6	38·0	19·6	46·2	38·7	·236	2·7	0·9	76	546	—	6	12	6	6	6·2	11	2·4
May	29·709	81·2	32·1	49·1	63·7	42·7	21·0	51·7	43·6	·285	3·2	1·1	75	538	—	7	4	8	12	7·0	17	1·8
June	29·915	94·5	45·3	49·2	79·5	53·9	25·6	64·9	53·7	·414	4·6	2·2	67	527	—	7	4	9	10	5·2	5	1·2
The Quarter..	29·834	94·5	27·2	67·3	66·9	44·9	22·1	54·3	45·3	·312	3·5	1·4	73	537	—	20	20	23	28	6·1	33	5·4
July	29·781	88·2	43·8	44·4	73·8	51·8	22·0	60·6	51·5	·380	4·3	1·7	72	529	—	10	3	11	7	6·8	12	2·9
August	29·826	86·9	43·3	43·6	75·6	52·1	23·5	62·0	51·7	·385	4·3	1·9	70	529	—	9	7	7	8	5·1	8	1·6
September ..	29·865	83·8	41·5	42·3	70·9	52·6	18·3	60·3	53·4	·408	4·6	1·3	78	531	—	3	7	10	10	7·1	10	0·9
The Quarter..	29·824	88·2	41·5	43·6	73·4	52·2	21·3	61·0	52·2	·391	4·4	1·6	73	530	—	22	17	28	25	6·3	30	5·4
October	29·834	69·5	33·0	36·5	59·9	43·9	16·0	50·8	46·1	·313	3·6	0·6	85	541	—	6	8	6	11	6·6	9	1·2
November ..	29·750	58·0	20·5	37·5	46·1	33·6	12·5	39·6	35·7	·209	2·4	0·4	86	552	—	7	14	5	4	7·0	7	0·4
December ..	29·771	53·5	30·3	23·2	45·1	36·6	8·5	41·0	37·8	·227	2·6	0·4	89	551	—	3	4	14	10	7·7	14	1·5
The Quarter..	29·785	69·5	20·5	49·0	50·4	38·0	12·3	43·8	39·9	·250	2·9	0·5	87	548	—	16	26	25	25	7·1	30	3·1
Winter 6 mo..	29·855	69·5	20·5	49·0	47·9	34·9	13·0	40·8	36·4	·266	2·6	0·5	85	553	—	36	49	45	55	6·2	49	6·4
Summer 6 mo.	29·829	94·5	27·2	67·3	70·2	48·5	21·7	57·6	48·8	·301	4·0	1·5	73	534	—	42	37	51	53	6·2	63	10·8
The Year	29·842	94·5	20·5	74·0	59·0	41·7	17·3	49·2	42·6	·283	3·3	1·0	79	543	—	78	86	96	108	6·2	112	17·2

1858.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction. N.	E.	S.	W.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·221	53·0	22·0	31·0	42·6	30·9	11·7	37·1	33·1	·188	2·2	0·4	85	564	0·8	6	2	10	13	5·2	7	0·5
February	29·919	51·0	21·0	30·0	40·3	28·8	11·5	34·8	29·9	·167	2·0	0·5	82	562	0·8	6	13	7	2	5·1	8	1·2
March	29·820	65·4	20·0	45·4	48·3	32·4	15·9	41·3	33·9	·195	2·3	0·8	75	552	1·0	10	5	4	12	5·1	9	0·7
The Quarter..	29·938	65·4	20·0	45·4	43·7	30·7	13·0	37·7	32·3	·183	2·2	0·6	81	559	0·9	22	20	21	27	5·1	24	2·4
April........	29·850	73·0	24·8	48·2	55·6	36·5	19·1	46·4	39·0	·238	2·7	0·9	76	547	1·1	6	9	10	5	5·4	10	2·8
May	29·816	83·0	31·6	51·4	60·8	41·6	19·2	52·0	45·3	·303	3·5	1·0	78	540	1·2	9	4	9	9	6·6	20	2·2
June........	29·970	95·0	43·0	52·0	76·5	51·6	24·9	65·2	54·3	·422	4·6	2·2	68	528	0·7	11	6	5	8	4·8	4	0·3
The Quarter..	29·879	95·0	24·8	70·2	64·3	43·2	21·1	54·5	46·2	·321	3·6	1·4	74	538	1·0	26	19	24	22	5·6	34	5·3
July	29·836	87·0	40·8	46·2	72·5	51·4	21·1	61·1	50·7	·369	4·1	1·9	69	530	1·0	10	2	5	14	5·8	10	1·9
August	29·886	88·4	42·4	46·0	73·3	52·0	21·3	62·0	52·5	·396	4·4	1·8	72	530	0·8	7	6	4	13	4·9	7	2·6
September ..	29·910	80·0	40·0	40·0	68·5	51·9	16·6	59·7	55·0	·433	4·8	1·0	85	532	0·8	2	8	7	13	6·4	10	1·2
The Quarter..	29·877	88·4	40·0	48·4	71·4	51·8	16·3	60·9	52·7	·399	4·4	1·2	75	531	0·9	19	16	16	40	5·7	27	5·7
October	29·888	66·6	30·0	36·6	57·9	43·7	14·2	50·4	46·7	·320	3·6	0·5	88	542	1·0	7	5	4	15	5·8	12	1·9
November ..	29·834	65·0	15·0	40·0	45·8	33·2	12·6	39·1	36·1	·214	2·4	0·4	90	554	0·7	11	10	4	5	6·1	12	0·6
December ..	29·822	53·4	28·6	24·8	44·4	35·2	9·2	39·9	37·4	·224	2·7	0·2	91	553	0·9	5	3	13	10	6·8	16	1·8
The Quarter..	29·848	66·6	15·0	51·6	49·4	37·4	12·0	43·1	40·1	·241	2·9	0·4	90	550	0·9	23	18	21	30	6·2	40	4·3
Winter 6 mo..	29·893	66·6	15·0	51·6	46·6	34·1	12·5	40·4	36·2	·212	2·5	0·5	85	554	0·9	45	38	42	57	5·6	64	6·7
Summer 6 mo.	29·878	95·0	24·8	70·2	67·8	47·5	18·7	57·7	49·4	·360	4·0	1·3	75	534	1·0	45	35	40	62	5·7	61	11·0
The Year	29·885	95·0	15·0	80·0	57·2	40·8	15·6	49·0	42·8	·286	3·3	0·9	80	540	0·9	90	73	82	119	5·6	125	17·7

1858.	Mean pressure of the atmosphere.	Temperature of the Air.						Mean temperature.		Vapour.			Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind.					Mean amount of cloud.	Rain.	
		Highest.	Lowest.	Range.	Mean.					Elastic force.	In a cubic foot of air.				Estim. strength.	Direction.					No. of days it fell.	Amount collected.
					Of all the highest.	Of all the lowest.	Daily range.	Air.	Dew point.		Mean weight.	Short of saturation.				N.	E.	S.	W.			
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·108	54·0	22·8	31·2	43·3	31·4	11·9	37·5	33·0	·189	2·2	0·5	84	561	0·4	4	3	10	14	6·9	6	6·2
February	29·863	51·0	20·5	30·5	42·7	28·3	14·4	35·2	31·3	·177	2·0	0·4	86	559	0·4	4	14	5	5	5·9	4	0·3
March	29·724	69·5	16·5	53·0	53·7	32·7	21·0	42·2	36·8	·219	2·5	0·6	83	549	0·4	7	14	6	14	5·4	10	0·8
The Quarter..	29·898	69·5	16·5	53·0	46·6	30·8	15·8	38·3	33·7	·195	2·3	0·5	84	556	0·4	15	31	21	33	6·1	20	7·3
April	29·803	79·0	23·0	56·0	56·6	36·2	20·4	46·0	37·4	·225	2·6	1·0	73	546	0·4	5	13	7	5	6·3	10	2·4
May	29·738	84·0	30·9	53·1	63·3	42·4	20·9	52·5	42·7	·274	3·1	1·3	70	543	0·4	6	6	9	10	7·9	12	1·4
June	29·917	92·2	39·5	52·7	78·0	51·7	26·3	64·4	51·6	·383	4·1	2·4	63	528	0·2	8	5	6	11	5·7	8	1·3
The Quarter..	29·819	92·2	23·0	69·2	66·0	43·4	22·8	54·3	43·9	·294	3·3	1·6	69	539	0·3	19	24	22	27	6·6	30	5·1
July	29·758	86·8	38·8	48·0	73·1	48·8	24·3	60·6	48·6	·343	3·8	2·1	65	529	0·4	10	3	4	14	6·4	11	1·2
August	29·799	90·5	39·8	50·7	74·4	50·9	23·5	62·0	50·6	·370	4·1	2·1	67	528	0·3	10	5	7	9	6·7	19	3·0
September ..	29·821	85·0	37·9	47·1	68·2	49·1	19·1	58·6	50·8	·374	4·2	1·3	76	532	0·3	5	4	10	11	6·6	16	2·3
The Quarter..	29·793	90·5	37·9	52·6	71·9	49·6	22·6	60·4	50·0	·362	4·0	1·8	69	530	0·3	25	12	21	34	6·6	45	6·5
October	29·813	69·5	32·2	37·3	57·5	42·1	15·4	49·4	44·0	·289	3·3	0·7	82	542	0·4	—	—	—	—	8·0	14	3·4
November ..	29·759	54·5	13·2	41·3	46·3	34·1	12·2	39·9	36·2	·204	2·5	0·4	87	552	0·2	—	—	—	—	7·6	8	0·7
December ..	29·708	54·0	24·8	29·2	43·9	34·5	9·4	39·6	35·7	·210	2·4	0·4	86	552	0·4	—	—	—	—	8·4	16	1·9
The Quarter..	29·760	69·5	13·2	35·9	49·2	36·9	12·3	43·0	38·6	·238	2·7	0·5	85	549	0·3	—	—	—	—	8·0	38	6·0
Winter 6 mo..	29·829	69·5	13·2	56·3	47·9	33·8	14·1	40·5	36·1	·216	2·5	0·5	84	552	0·3	—	—	—	—	7·0	58	13·3
Summer 6 mo.	29·806	92·2	23·0	69·2	68·9	46·5	22·7	57·3	46·9	·328	3·6	1·7	69	534	0·3	—	—	—	—	6·6	75	11·6
The Year	29·817	92·2	13·2	79·0	58·4	40·2	18·4	48·9	41·5	·272	3·1	1·1	77	543	0·3	—	—	—	—	6·8	133	24·9

1858.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction. N.	E.	S.	W.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.								in.
January	30·145	56·0	20·0	36·0	44·3	31·6	12·7	38·1	34·5	·199	2·3	0·4	87	561	1·8	3	5	9	14	5·7	16	0·8
February	29·938	51·5	16·5	35·0	42·6	28·6	14·0	35·4	31·8	·180	2·1	0·4	87	561	1·9	7	12	5	4	6·0	9	0·7
March	29·793	66·9	19·5	47·4	49·8	32·8	17·0	41·5	36·3	·215	2·5	0·6	83	551	2·1	7	2	7	15	6·4	12	1·5
The Quarter..	29·955	66·9	16·5	50·4	45·6	31·0	14·6	38·3	34·2	·198	2·3	0·5	86	558	1·9	17	19	21	33	6·0	37	3·0
April	29·845	76·3	22·5	53·8	55·9	38·4	17·5	46·4	39·8	·250	2·9	0·7	80	547	1·7	6	9	7	8	6·4	13	2·7
May	29·799	85·4	31·2	54·2	60·5	42·7	17·8	51·8	46·8	·321	3·6	0·8	83	539	2·0	8	4	8	11	7·1	19	1·8
June	29·966	88·4	40·7	47·7	73·6	50·2	23·4	62·0	54·6	·427	4·7	1·5	77	531	1·8	6	5	5	14	5·5	11	4·6
The Quarter..	29·870	88·4	22·5	65·9	63·3	43·8	19·6	53·4	47·1	·333	3·7	1·0	80	539	1·8	20	18	20	33	6·3	43	9·1
July	29·820	78·9	38·0	40·9	70·5	48·5	22·0	57·9	52·0	·390	4·4	1·1	80	533	1·9	8	3	6	14	6·5	14	1·6
August	29·864	84·2	38·5	45·7	72·1	51·6	20·5	60·4	53·3	·407	4·5	1·3	78	531	1·7	5	5	7	14	6·7	15	2·2
September ..	29·878	80·7	38·5	42·2	68·0	50·1	17·9	57·9	53·9	·417	4·7	0·7	86	534	1·7	3	6	10	11	6·5	14	3·4
The Quarter..	29·854	84·2	38·0	46·2	66·9	50·1	20·1	58·7	53·1	·405	4·5	1·0	81	533	1·8	16	14	23	39	6·6	43	7·2
October	29·867	68·8	34·2	34·6	55·5	43·0	13·5	49·0	45·2	·303	3·5	0·5	87	544	1·4	6	3	10	12	7·5	17	3·3
November ..	29·835	57·5	15·7	41·8	46·6	33·2	13·4	39·4	36·6	·218	2·5	0·3	90	554	1·3	8	8	6	8	7·4	14	1·0
December ..	29·751	56·5	23·5	33·0	45·3	34·9	10·4	40·1	36·9	·219	2·5	0·4	89	552	1·6	1	5	14	11	7·6	19	1·7
The Quarter..	29·818	68·8	15·7	43·1	49·5	37·0	12·4	42·8	39·6	·247	2·8	0·4	89	550	1·4	15	16	30	31	7·5	50	6·0
Winter 6 mo..	29·886	68·8	16·5	52·3	47·5	34·0	13·5	40·5	36·9	·222	2·5	0·4	87	554	1·6	32	25	51	64	6·7	87	9·0
Summer 6 mo.	29·862	88·4	22·5	65·9	65·1	47·0	19·9	56·1	50·1	·370	4·1	1·0	81	536	1·8	36	32	43	72	6·5	86	16·3
The Year	29·874	88·4	16·5	71·9	56·3	40·5	16·7	48·3	43·5	·296	3·3	0·7	84	545	1·7	68	67	94	136	6·6	173	25·3

1853.	Mean pressure of the atmosphere.	Temperature of the Air. Highest.	Lowest.	Range.	Mean. Of all the highest.	Of all the lowest.	Daily range.	Mean temperature. Air.	Dew point.	Vapour. Elastic force.	In a cubic foot of air. Mean weight.	Short of saturation.	Mean deg. of humidity. Saturation = 100.	Mean weight of a cubic foot of air.	Wind. Estim. strength.	Direction.	Mean amount of cloud.	Rain. No. of days it fell.	Amount collected.
	in.	°	°	°	°	°	°	°	°	in.	gr.	gr.		gr.					in.
January	29·752	54·0	33·0	21·0	48·6	40·5	8·1	49·9	39·7	·262	3·0	0·6	84	542	3·0	SW.	—	17	4·4
February	29·702	47·0	24·0	23·0	29·8	31·7	8·1	37·7	27·5	·170	2·0	0·7	75	552	3·0	N.	—	14	3·2
March	29·940	56·0	27·0	29·0	46·0	36·7	9·3	40·4	30·9	·196	2·2	0·8	72	551	2·2	N.	—	15	0·9
The Quarter..	—	56·0	24·0	32·0	44·8	36·3	8·5	40·3	32·7	·209	2·4	0·7	77	548	2·7	—	—	46	8·5
April	—	61·0	36·0	25·0	54·4	43·9	10·5	48·0	38·7	·252	2·9	1·1	73	—	2·8	W.	—	12	1·6
May	—	73·0	36·0	37·0	61·7	48·0	13·7	52·7	45·5	·320	3·7	1·0	78	—	2·0	NE.	—	13	3·6
June	—	75·0	47·0	28·0	66·1	54·7	11·7	58·0	51·5	·393	4·4	1·1	81	—	2·3	N. & SW.	—	16	2·3
The Quarter..	—	75·0	36·0	39·0	60·7	48·9	12·0	52·9	45·2	·322	3·7	1·1	77	—	2·4	—	—	41	7·5
July	—	75·0	51·0	24·0	65·7	55·9	9·8	59·0	55·8	·416	4·7	1·0	82	—	2·5	SW.	—	—	2·7
August	—	73·0	49·0	24·0	66·9	54·9	12·0	59·3	55·4	·403	4·5	1·2	79	—	2·2	SW. & NE.	—	—	2·5
September ..	—	67·0	45·0	22·0	63·0	51·9	11·1	56·6	53·3	·377	4·3	1·0	81	—	2·0	—	—	—	1·3
The Quarter..	—	75·0	45·0	30·0	65·2	54·2	11·0	58·3	54·8	·399	4·5	1·1	82	—	2·2	—	—	—	6·5
October	—	63·0	41·0	22·0	57·3	49·1	8·2	52·8	46·8	·334	3·8	0·9	82	—	2·6	SW.	—	21	4·8
November ..	—	59·0	31·0	28·0	50·6	43·0	7·6	46·8	41·8	·282	3·3	0·6	85	—	2·2	N.	—	14	2·8
December ..	—	52·0	24·0	28·0	42·3	35·2	7·1	39·2	34·3	·216	2·5	0·5	85	—	2·6	N.	—	13	3·6
The Quarter..	—	63·0	24·0	39·0	50·1	42·4	7·6	46·3	42·0	·277	3·2	0·7	84	—	2·5	—	—	48	11·2
Winter 6 mo..	—	63·0	24·0	39·0	47·4	39·3	8·1	43·3	37·3	·243	2·8	0·7	81	—	2·6	—	—	94	19·7
Summer 6 mo.	—	75·0	36·0	39·0	62·9	51·6	11·5	55·6	50·0	·361	4·1	1·1	79	—	2·3	—	—	—	14·0
The Year	—	75·0	24·0	51·0	55·1	45·4	9·8	49·4	43·6	·302	3·5	0·9	80	—	2·4	—	—	—	33·7